DEC 7 1942

ENGINEERING NEWS-RECORD

DECEMBER 3, 1942

Fabricating Top Chord of 160-ft. Laminated Timber Truss for the Roof of a U. S. Army Aircraft Hangar.

BLAST FURNACE DEMOLITION

RIGID TIMBER FRAME DESIGN

ROAD MAINTENANCE WITH TARS

ESTABLISHING AIRFIELD GRADES

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Here's another

WAR TIME INDUSTRIAL JOB FOR RADIANT HEATING

. . . and for

BYERS WROUGHT IRON

One of the greatest services an engineer can render his country today is to find new ways and means of doing more and more jobs with less and less material. And the engineering profession is meeting the challenge.

In designing the heating for two new industrial buildings in a large eastern manufacturing plant, the engineers took two important metal-saving steps: (1) they installed Radiant Heating, and (2) they used Byers Wrought Iron.

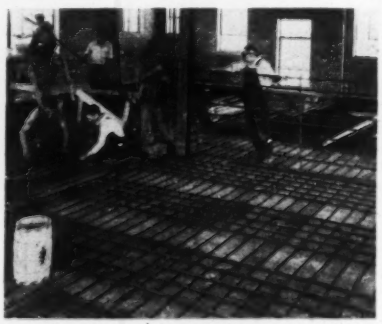
Radiant Heating is extremely economical in materials required. A comparative check made on metal requirements, exclusive of boiler, for the heating plant in a small structure showed a conventional hot water system, 1700 pounds; a 2-pipe steam system, 1200 pounds; and Radiant Heating, 950 pounds.

Equally important in real conservation is the elimination of premature repairs. The unusual resistance of Byers Wrought Iron to all the service hazards encountered in Radiant Heating is a matter of engineering record which you can easily verify.

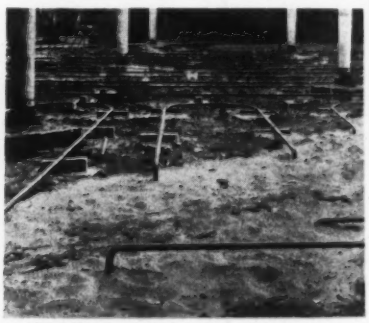
If you have any essential construction in prospect which involves a heating problem, we strongly suggest that you check the heating needs against the proven advantages of Radiant Heating. We have records and reports on several hundred installations which provide practical answers out of practical engineering experience, and these are at your service. You will also find our technical bulletin, "Byers Wrought Iron for Radiant Heating Installations" very interesting and helpful. May we send you a copy?

A. M. Byers Company. Established 1864. Offices in Pittsburgh, Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

Corrosion costs you more than Wrought Iron



Installing Byers Wrought Iron pipe coils for Radiant Heating in the second floor of an industrial office building. Fuel requirements were far under comparative estimates.



Radiant Heating coils installed in the administration building of a large manufacturing plant. After two years operation, the system was reported as satisfactory in all respects.

BYERS GENUINE WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

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ENGINEERING NEWS-RECORD

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Vol. 129 DECEMBER 3, 1942 No. 23

COMING NEXT

"Alcan—America's Glory Road," the roadbuilding story of the year, begins Dec. 17 with the first of a series of three articles written by Western Editor Harold W. Richardson, first person to travel the full length of this vital military route. The first article outlines the route and reasons for its selection. A succeeding installment deals with the problems of supply, of living and working conditions and with difficulties encountered in keeping equipment rolling. The concluding article will describe the work of the engineers and contractors.

• Construction of two identical airship hangars was recently completed for the Navy. These projects were handled by different contracting firms, and each contractor used a different procedure in erecting the steel work. A comparison of the two methods will be outlined in *ENR* for Dec. 17.

• Faced with the problem of providing sanitary, low-cost disposal of refuse at camps, the Army has adopted landfill methods. Procedures and equipment recommended for camp use are of special interest to municipal engineers.

LOOKING AHEAD

• Two major bridge projects of the year are to be described in early issues. One is the new Charter Oak Bridge over the Connecticut River at Hartford, which in its central 270-300-270-ft. continuous girder unit contains the longest plate girders in the United States. The second project is the unusual highway bridge nearing completion over the Mississippi River at Dubuque, Iowa. This structure is uncommon in that the main river crossing is a 3-span continuous truss with a 845-ft. central span built as cantilever and made a tied arch by addition of ties at roadway level.

• Building oil pipelines is a specialized construction operation in which American engineering genius excels. Every bit of this genius plus a lot of sweat are now being applied to complete in less than a year a 1,250-mile line from Texas to the Atlantic seaboard. A story packed with pictures shows how the "pipeliners" are tackling this job.

PAGE

The Week's Events 53

Reader Comment 60

Editorials 62

Blast Furnaces Dismantled and Moved 64

Bowstring Trusses On Buttressed Columns 69

First-Aid for Sanitation Needs 73

Belt Delivers Fill for Earth Dam 75

ABC's of Road Maintenance With Tars 79

Establishing Grades on Airfields 84

Designing Rigid Frames of Timber 88

Organization Speeds Industrial Building Program 92

From Field and Office 94

Book Notes and Reviews 96

Unit Prices 98

New Aids to the Constructor 107

Manufacturers' Activities 114

New Manufacturers' Publications 122

Men and Jobs 124

Meetings 128

Construction Reports 135

Number of copies of this issue printed: 37,470

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IN
RYERSON STOCK

Your nearby Ryerson plant carries reinforcing bars, wire mesh, structurals, roofing... and practically every form of construction steel and allied products . . . in stock for immediate shipment.

The demands of wartime, naturally, have limited our stock, but we are in a position to furnish steel for the war program and essential industries.

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The Ryerson Contractors & Builders Division offers a comprehensive service for planning and completing your jobs on time. Shipments of fabricated structural steel; or cut, bent and tagged reinforcing bars are scheduled to meet your actual day-to-day needs as the job progresses. Let Ryerson engineers help you with plans or problems.

New 1942 Stock List mailed on request

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Joseph T. Ryerson & Son, Inc. Plants in: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

Complete Facilities for cutting, bending or forming Reinforcing steels to specification.

Prompt Deliveries to meet your day-to-day job needs and keep materials coming on schedule.

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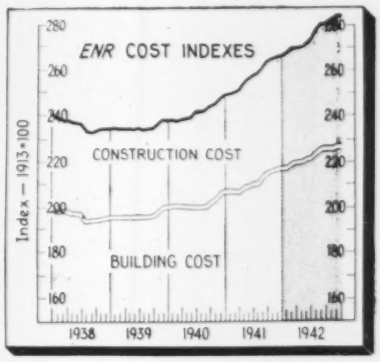
MONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW CAPITAL . . . . F H A MORTGAGES

(,000 omitted)	November 1941	November 1942	% Change	Eleven Months 1941	Eleven Months 1942	% Change
Total Construction	$348,800	$607,622	+74.0	$5,599,010	$8,932,207	+60.0
Private Construction	68,432	30,763	−55.0	1,130,130	542,544	−52.0
Public Construction	280,368	576,859	+106.0	4,468,880	8,389,663	+88.0
Federal	221,391	560,212	+153.0	3,332,838	7,896,193	+137.0
Total New Productive Capital	$193,091	$648,257	+236.0	$6,282,297	$10,204,255	+63.0
Private Investment	45,340	9,969	−78.0	752,438	385,914	−49.0
Federal (non-federal work)	22,751	26,000	+14.0	578,741	239,155	−59.0
Federal (federal work)	125,000	612,288	+390.0	4,951,118	9,579,186	+93.0
FHA Mortgages Selected for Appraisal (Title II)	$72,601	.....	.....	$1,294,083	.....	.....
(Title VI)	$19,137	.....	.....	161,118	.....	.....



CONSTRUCTION COSTS . . . . WAGE RATES . . . . PRICES

	December 1941	December 1942	% Change	Changes November to December 1941 Nov.	1941 Dec.	1941 %	1942 Nov.	1942 Dec.	1942 %
E N R Construction Cost Index, 1913 = 100‡	266.16	283.69	+6.6	266.13	266.16	*	283.64	283.69	*
E N R Building Cost Index, 1913 = 100‡	216.37	226.63	+4.7	216.54	216.37	−0.1	226.58	226.63	*

‡ *Does not reflect increased costs due to more overtime, lower labor efficiency, delivery delays, etc.*

ENR 20-CITIES' AVERAGE

	December 1941	December 1942	% Change	Changes November to December 1941 Nov.	1941 Dec.	1941 %	1942 Nov.	1942 Dec.	1942 %
Common Labor	$0.769	$0.832	+8.2	$0.768	$0.769	+0.1	$0.832	$0.832	0
Skilled Labor (Av. 3 trades)	1.521	1.599	+5.1	1.521	1.521	0	1.599	1.599	0
Bricklayers	1.614	1.693	+4.9	1.614	1.614	0	1.693	1.693	0
Structural Ironworkers	1.588	1.661	+4.6	1.588	1.588	0	1.661	1.661	0
Carpenters	1.362	1.442	+5.9	1.362	1.362	0	1.442	1.442	0
Cement, per bbl.	$2.56	$2.60	+1.5	$2.54	$2.56	+0.8	$2.60	$2.60	0
Reinforcing steel, cwt.	2.59	2.70	+4.2	2.60	2.59	−0.4	2.72	2.70	−0.7
Struct. steel shapes, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.19	1.21	+1.7	1.19	1.19	0	1.21	1.21	0
Lumber, 2x4 Fir, per M ft.	46.70	51.55	+10.4	46.86	46.70	−0.3	51.55	51.55	0
Lumber, 2x4 Pine, per M ft	40.68	44.33	+9.0	40.82	40.68	−0.3	44.24	44.33	+0.2
Brick, common, per M	15.26	15.66	+2.6	15.16	15.26	+0.7	15.66	15.66	0
Ready-mixed concrete, c.y.	7.15	7.37	+3.1	7.11	7.15	+0.6	7.34	7.37	+0.4
Struct. clay tile, 3x12x12	77.24	78.47	+1.6	76.94	77.24	+0.4	78.47	78.47	0
Paving asphalt, cars, ton	15.10	14.92	−1.2	15.10	15.10	0	14.92	14.92	0

* *Less than .05 percent change.*

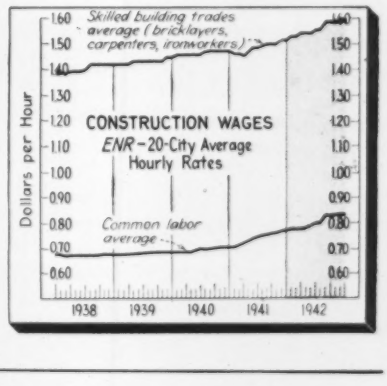
ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
Dec., 1942	283.69	136.37	226.63	122.51		
Nov., 1942	283.64	136.35	226.58	122.48	462	202
Oct., 1942	282.44	135.77	225.90	122.11	421	185
Sept., 1942	281.61	135.37	225.46	121.88	544	238
Aug., 1942	281.61	135.37	225.39	121.84	622	273
July, 1942	277.65	133.46	223.45	120.79	736	323
June, 1942	274.19	131.80	221.18	119.56	752	330
May, 1942	272.30	130.89	220.14	119.00	821	360
April, 1942	271.78	130.64	219.55	118.68	569	249
Mar., 1942	269.71	129.65	218.88	118.32	578	253
Feb., 1942	269.41	129.51	218.44	118.08	507	222
Jan., 1942	267.63	128.65	217.12	117.37	402	176
Dec., 1941	266.16	127.94	216.37	116.96	217	95
Nov., 1941	266.13	127.93	216.54	117.05	282	124
1942 (Av.)	276.31	132.82	222.39	120.22		
1941 (Av.)	257.84	123.95	211.46	114.32	375	164
1940 (Av.)	241.96	116.31	202.81	109.64	269	118
1939 (Av.)	235.51	113.21	197.44	106.73	211	92

MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	November 1941	November 1942	% Change	Oct. 1942	% Change Oct.-Nov.
Lumber (% 1935–'39 wk. seas. av.) N. L. M. A.	151.5	152.3	+0.5	133.5	+14.1
Steel (% operating capacity) A. I. S. I.	96.9	99.1	+2.3	100.2	−1.1

	October 1941	October 1942	% Change	Ten Months 1941	Ten Months 1942	% Change
Fabricated Structural Steel, tons, A.I.S.C.	217,738	146,648	−32.7	1,892,370	1,758,001	−7.0
Cement, thous. bbl., U.S. B. of M.	17,833	20,344	+14.1	142,273	161,616	+13.4
Building Permits, Dun & Bradstreet (,000 omitted)	$124,746	$44,803	−64.1	$1,277,134	$723,725	−43.3



COST OF LIVING INDEXES . . . . EMPLOYMENT

	October 1941	October 1942	% Change	Sept. 1942	% Change Sept.-Oct.
Cost of Living Index, N.I.C.B.	92.0	99.5	+8.2	98.6	+0.9
Rent (Housing) Index, N.I.C.B.	89.4	90.8	+1.6	90.8	0
Total Employment (est.) thous., B.L.S.	36,053	38,555	+6.8	38,348	+0.5
Construction Employment (est.) thous., B.L.S.	2,672	2,042	−23.5	2,242	−10.7

ENGINEERING CONSTRUCTION CONTRACTS——ENGINEERING NEWS-RECORD——NOVEMBER, 1942

Engineering News-Record *reports projects of the following minimum costs—waterworks, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Four Weeks—Thousands of Dollars (000 Omitted)

	New England	Middle Atlantic	South	Mid West	West of Mississippi	Far West	United States November 1942	United States Eleven Months 1942	United States Eleven Months 1941	Canada
Public Works										
Waterworks	553	923	1,931	1,600	856	600	6,463	140,066	74,221	306
Sewerage	357	659	2,714	1,003	1,393	1,044	7,170	113,309	80,981	175
Bridges, public	25	75	242	130	186	187	845	48,492	101,850	.....
Earthwork and waterways	.....	22	822	1,000	1,577	228	3,649	249,065	238,985	.....
Streets and roads	213	3,083	3,049	3,139	5,163	4,731	19,378	509,926	552,424	580
Buildings, public	8,381	60,742	78,217	43,921	118,291	69,231	378,783	5,477,312	2,641,334	6,731
Unclassified, public	9,286	19,076	28,864	52,276	24,561	26,508	160,571	1,851,493	779,085	1,921
Total public	**18,815**	**84,580**	**115,839**	**103,069**	**152,027**	**102,529**	**576,859**	**8,389,663**	**4,468,880**	**9,713**
Federal government (included in above classifications)	18,539	81,762	114,015	99,276	148,474	98,146	560,212	7,896,193	3,332,838	.....
Private										
Bridges, private	.....	.....	.....	.....	.....	.....	.....	890	5,798	.....
Industrial buildings	993	525	650	5,165	901	208	8,442	196,470	481,379	2,311
Commercial buildings	2,127	7,838	200	4,148	785	3,952	19,050	283,679	459,463	.....
Unclassified, private	176	275	1,174	65	1,531	50	3,271	61,505	183,490	48
Total private	**3,296**	**8,638**	**2,024**	**9,378**	**3,217**	**4,210**	**30,763**	**542,544**	**1,130,130**	**2,359**
Total Engineering Construction:										
November, 1942 — 4 weeks	**22,111**	**93,218**	**117,863**	**112,477**	**155,244**	**106,739**	**607,622**	.....	.....	**12,072**
October, 1942 — 5 weeks	19,943	115,637	130,152	140,824	162,431	122,992	691,979	.....	.....	29,409
November, 1941 — 4 weeks	28,040	67,971	40,023	89,347	65,691	57,728	348,800	.....	.....	12,321
Eleven Months — 1942	**438,896**	**1,185,436**	**1,790,738**	**1,555,403**	**2,409,712**	**1,552,022**	.....	**8,932,207**	.....	**212,699**
Eleven Months — 1941	296,528	1,137,548	1,197,586	868,515	1,294,662	804,171	.....	.....	5,599,010	244,936

OPEN FOR TRAFFIC IN 10 HOURS

. . . instead of 3 to 5 days

Contractor tells how Atlas High-Early cement speeded repaving job

A RAILROAD siding crossing a main highway had to be repaved at the Owens-Illinois glass plant, Huntington, W. Va. It was vitally important that railroad cars into and out of the plant be kept on the move, and that traffic congestion on the highway be kept to a minimum.

Here was a rush job calling for Atlas High-Early cement, and here is how The Price Construction Co. of Huntington, W.Va., used this easy-to-work cement to save valuable time. Two lanes of the four-lane highway shown above were closed to traffic while concrete was placed between the tracks. The concrete gained strength rapidly. After only 10 hours, the contractor reported, these lanes were reopened to traffic. With standard portland cement the two lanes would have been closed for at least 3 to 5 days. The same time was saved in placing concrete in the other two lanes. Thus traffic flow to the plant and on the highway was maintained with a minimum of congestion and delay.

When war jobs demand quick completion, call on Atlas High-Early cement—it saves days, delays and dollars. It speeds up completion of hangars, runways, housing projects, factory foundations, floors and platforms and structures at army bases, airfields, camps and ordnance depots.

Concrete made with Atlas High-Early cement cuts time required for protection and curing, particularly in cold weather. Forms may be released sooner; thus fewer forms may be required, saving lumber. Structures often are ready earlier for occupancy and use. Whatever the concrete job, Atlas High-Early cement promises to give you speed with economy. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • DECEMBER 3, 1942 • VOLUME 129 • NUMBER 23

WPB turns to war program for cuts in construction work

Announced policy of scaling down construction program for coming year appears in first order halting work for military. Additional civil work curtailed.

THE War Production Board's drive to cut down construction next year to about two-thirds of this year's program has now entered the field where most of the cutting will have to be done in the war program itself.

Despite the fact that cuts to date have been largely in civil jobs (*ENR*, Nov. 26, p. 747) the bulk of the construction is in the direct war program, and that's where major curtailment must be enforced.

The first blow at war work came with a WPB order to stop construction of the $45,000,000 Continental Ordnance Plant at Hammond, Ind. The plant had just been placed under construction, after authorization last August. About $1,000,000 worth of work had been done when the stop order went through.

The Continental stop order, which is expected to be followed by stop orders on some other military projects, illustrates the connection between the squeeze on construction and the general program now underway to cut munitions production schedules down to a feasible size and, correspondingly, to reorient the program to stress the more important types of goods.

The Continental plant was to produce tank armor, and the tank program for 1943 is being cut by about 40 percent.

While thus starting to chop down the military program, WPB last week moved ahead on its program of cutting civil work. It ordered work stopped on two Connecticut highway bridges—the New London-Groton bridge and the Hartford-Eastern bridge.

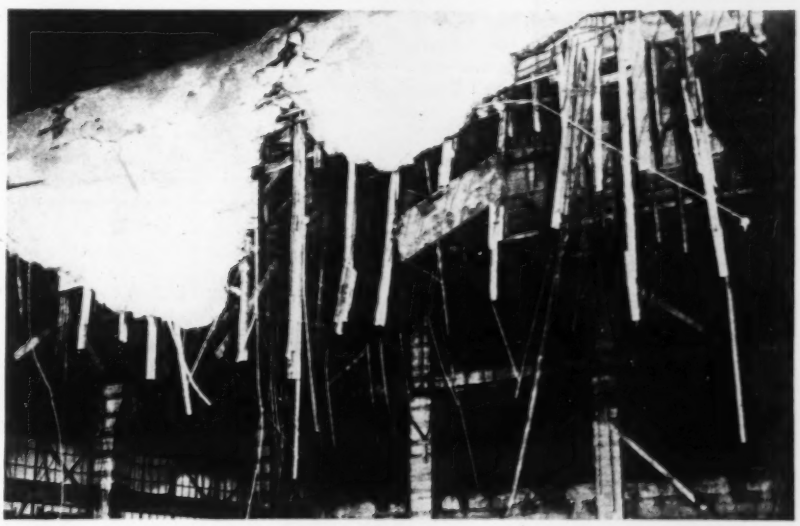
Announcement of the order on the Connecticut bridges brought a statement last week from William J. Cox, state highway commissioner, who said that if construction of the New London Bridge is not interrupted, it will be ready for service in a few weeks. Cox said one week is required to complete riveting steel, three weeks for placing the concrete deck and four weeks for sidewalks, curbs and clean-up. Any stoppage now, Cox added, will throw this work into real winter weather, delaying the opening indefinitely. The Hartford Bridge was opened in September, and work subject to the announced stop-order is on one of the several approaches.

Earlier in the week, WPB limited installation of generators at three TVA projects. It forbade installation of generators 3, 4, and 5 at the Kentucky Dam, while permitting units 1 and 2 to proceed. At the Watts Bar steam plant, generator 4 was eliminated, but addition next year of a third generator to the two now operating will be permitted. Unit 3 at Fontana Dam was also eliminated.

The full dimensions of the cut in civilian construction are not yet clear. In some cases civilian agencies have stopped projects at the mere nod of the WPB, without waiting for a formal order. In other cases, formal orders have been issued but not immediately complied with; thus, work is still proceeding in reclamation jobs which WPB ordered halted a month ago. And large construction programs are still under negotiation; in these cases the WPB has given the construction agencies a chance to show cause why their jobs should be continued.

Thus only a partial list of halted projects can be compiled at this time. Among the larger projects on such a list would be the following:

Flood control and power projects of the U. S. Engineer Department shut down or reduced to such work as is necessary in the interests of public safety are Bluestone Dam on the New River in West Virginia, Markham Ferry and Fort Gibson dams on the Grand River



Form collapse kills 4 Canadians

Collapse of formwork for a reinforced concrete roof of a two story building extension at Welland, Ont., during concreting operations recently killed four men and injured thirty-one others.

Scene of the disaster was the plant of the Atlas Steel Co., where concrete was being placed in a 6-in. slab, 20 ft. wide and 60 ft. long. The formwork was supported on steel jack scaffolding which had been inspected earlier in the day and found to be satisfactory. The mass of reinforcing steel added to the difficulty of rescue, much of the steel having to be cut away with torches.

More than 400 men were employed on the job at the time of the collapse. Contractors are the Piggott Construction Co. of Hamilton, Ont.

in Oklahoma, Wolf Creek and Center Hill dams on the Cumberland River, Allatoona Dam at the headwaters of the Coosa River in Georgia, and High Point Dam on the Yadkin River in North Carolina. Installation of additional generators in power plants at Norfork, Denison and Fort Peck dams also was stopped.

Work on Watauga and South Holston dams of the Tennessee Valley Authority also was stopped, as was work on a steam station at Wilson Dam.

Principal projects of the U. S. Bureau of Reclamation to be stopped were Davis Dam on the Colorado River, midway between Boulder and Parker dams, and Anderson Ranch Dam, 330 ft. high earth-fill in Idaho. Work on Keswick Dam of the Central Valley Project in California, now about half complete, is authorized to proceed to the extent necessary to protect the fish industry. Work on power unit No. 5 for Shasta Dam has been stopped, as has work on the right powerhouse at Grand Coulee Dam and on Units L-7, L-8 and L-9 of the left powerhouse. Work on five generators to be installed in 1943 is going ahead.

Some work uncertain

Final decision as to closing down work on the Colorado-Big Thompson project has not been reached. Green Mountain Dam of this project and its power plant will be completed in March 1943. The big work now in hand is the Continental Divide Tunnel.

Similar uncertainty surrounds current work on the following irrigation projects: Gila, Minidoka, Altus, Klamath, Provo and Shoshone.

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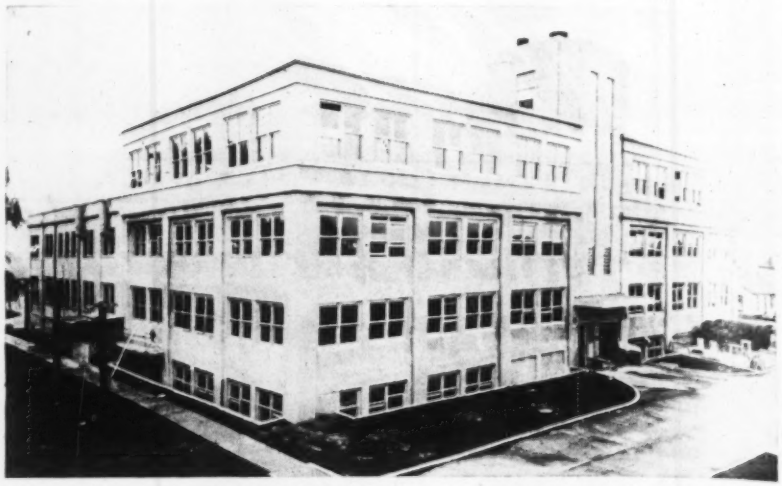

Laboratory building will aid war effort

Devoted to the processing of human serum albumin, and to the manufacture of typhus and smallpox vaccines, this new building will aid in protecting the health of our armed forces. The structure is of reinforced-concrete construction, with all partitions and furring on the first and second floors finished with brick tile. Windows are woodframe.

The building houses four cold rooms with an adjacent finishing room, to be used in the processing of blood collected by the American Red Cross into human serum albumin; other parts of the three story building are devoted to glass washing, glassware storage, machinery, incubators, laboratories, locker rooms and offices.

The air supply to the cold rooms passes through filters, a precipitron and a stretch of duct work with sterilamps, and then through a cooling unit designed to cool entering air to about 40 deg. F. After this initial cooling, air is discharged into No. 1 cold room, where a temperature of 35 deg. F. is maintained. Thence it passes to the second and third cold rooms, where 25 deg. F. temperature is required. Each room is equipped with additional ceiling unit coolers automatically controlled. The process equipment in the three rooms consists mainly of refrigerated kettles and refrigerated centrifuges. The fourth cold room has no make-up air supply and is equipped with vapor-proof lights and sterilamps.

The ventilation of the remainder of the building is generally by exhaust fans in the various windows over areas where heat is generated. Air is supplied by three separate make-up units, with a total capacity of about 50,000 cfm. The air is passed through filters and tempering coils and is then discharged into the central corridor system, from which it passes to the various rooms on the outer perimeter. The intention of the whole ventilating system is to create a positive pressure throughout the building, so that no unfiltered air can enter.

The building was constructed for E. R. Squibb & Sons, New Brunswick, N. J., by Turner Construction Co., New York. Abbott, Merkt & Co., New York, were the engineers.

U. S. to aid Mexico in railroad expansion

In order to assist the Mexican government in strengthening its national railway system to meet the increased tonnage demands resulting from war activities (*ENR*, Nov. 19, p. 691), the United States government has sent a technical mission to Mexico to help carry out an extensive rehabilitation program.

The commission is headed by Oliver M. Stevens, former executive officer of the Missouri Pacific Railroad, and now president of the American Refrigerated Transit Co. His staff includes mechanical, track and transportation technicians.

The agreements under which the cooperation between the two nations will be effected provide that the United States, through the office of the Coordinator of Inter-American Affairs, will supply certain material, equipment and technical assistance deemed necessary. The program will be carried through with the cooperation of the Board of Economic Warfare, the War Production Board and the Department of State.

The Mexican government and the Mexican National Railways will contribute a proportionate share of material and equipment, as well as direct operating facilities toward the fullest realization of the rehabilitation program.

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Northwestern Tech to train women engineers

Northwestern Technological Institute, Evanston, Ill., will train women students as engineers and technical workers as a move toward meeting a possible shortage in manpower, according to Ovid W. Eshbach, dean of the Institute.

Ferry to replace wrecked C&D Canal bridge

The War Department is planning to install a toll-free vehicular and passenger ferry to replace a bridge over the Chesapeake and Delaware canal wrecked some months ago (*ENR*, Aug. 6, p. 197) when a tanker rammed one of the supporting towers.

Representative David J. Ward, of the First Congressional district of Maryland, said that the Office of the Chief of Engineers of the U. S. Army had informed him that arrangements had been completed to secure a ferry boat for the operation, and that work would be rushed on construction of ferry boat pens, landing docks, and ramps, along with dredging of the required slips.

The Maryland State Roads Commission will handle the construction of approaches to the ferry terminals. The service is scheduled to open Jan. 15.

Army railway activities go to transport corps

Operation and maintenance of railroads, formerly a function of the Army's Corps of Engineers, has been transferred to the jurisdiction of the Transportation Corps, Services of Supply.

Included in the transfer is the Military Railway Service, headed by Brig. Gen. Carl R. Gray, Jr.

Among the military personnel affected, according to a War Department announcement, are all officers of the Corps of Engineers or other components of the Army, whose primary assignments were in connection with the transferred activities. These include personnel of the railway branch, troops division, and the railway equipment section, procurement branch, supply division, Office of Chief of Engineers. All activities and installations pertaining to research, design, development, procurement, storage and distribution of railway rolling stock for the War Department are included in the transfer.

The transportation corps, headed by Maj. Gen. Charles P. Gross.

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Zinc further restricted for non-essential uses

America's critical shortage of zinc has led to further curtailment of less essential uses in order to make more of the metal available for ammunition and other war products. Conservation Order M-11-b, as amended, issued Nov. 27 by the Director General for Operations of WPB further restricts use of zinc for manufacture of a variety of automobile parts, building materials, and industrial materials, and clarifies the language of the order to make it clear that protective coating and galvanizing is included in the restrictions of the order.

Among the products in which use of zinc is forbidden entirely by the order are a variety of building products, including the following: builders' supplies and hardware, except protective coatings; casement hardware, door knockers, down spouts, flashing, gutters, lock parts—except lock cylinders and sleeves, roofing, screen door and window attachments, siding, venetian blind hardware, weather stripping, grilles, insulation, stair treads and threshold, terrazzo strips and metal plastering bases.

These restrictions are applicable as of Nov. 30, 1942.

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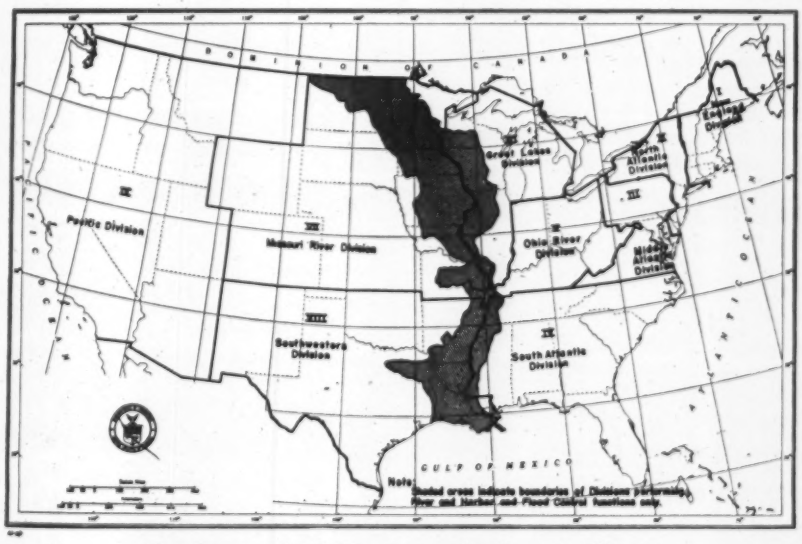
War housing projects fast nearing completion

Demountable dwellings for 13,700 war workers and their families in the Hampton Roads, Va., area, are becoming available at the rate of more than 200 a day, according to Milton Fischer, acting regional representative of the National Housing Agency.

The four projects, of prefabricated houses, will cost some $50,000,000 and constitute a sizable community in themselves. They are located at Newport News, Norfolk and Portsmouth.



Engineer division boundaries outlined

A recent reorganization of the engineering divisions of the corps of Engineers (ENR, Nov. 26, p. 741) to make their boundaries coincide with those of the nine Army service commands, is detailed in the map above.

Principal change, as noted in previous articles, is the combination of the former North Pacific, South Pacific and Mountain divisions into a new Pacific division with headquarters in Salt Lake City, Utah.

Shaded areas indicate divisions performing only river, harbor and flood control work.

WASHINGTON HIGHLIGHTS

"STRIPPING" of construction projects—reviewing their design for possible material savings before granting priority ratings—has resulted, Washington officials believe, in saving of about 400,000 tons of steel, 30,000 tons of copper, 200 tons of aluminum, and 3,000 tons of rubber.

RAPIDLY increasing distillation of tars for production of chemicals is expected to result in so much by-product output of creosotes as to eliminate soon any tightness in the supply for wood treatment. The creosote situation has been somewhat tight in the East and quite seriously tight on the West Coast. It is now expected that there will soon be plenty of creosote everywhere, but impregnating capacity may continue to limit the supply of treated timbers in the West. In the East, supplies of lower grade treated timbers and piling are expected to be relatively adequate, though high-grade structural timbers, treated and untreated, are short.

SALES of used construction equipment must be reported under the terms of WPB order L-192 to the used construction machinery specialist at the nearest WPB regional office thirty days before the sale is consummated if the equipment was originally bought new under the terms of L-192—i. e., if the purchase was based on an approved application to WPB on form PD-556—and if the equipment is of a type listed in List A of L-192. The report of re-sale must be made on form PD-1159. Sale of used equipment acquired before L-192 went into effect need not be reported before the fact; a change of status report must, of course, be filed after the sale as part of the WPB's continuing inventory of used equipment.

It was incorrectly reported in *ENR* of Nov. 12 that all sales of used equipment must be reported thirty days before consummation of the sale.

TO PROVIDE additional residual fuel for war industries and to conserve transportation, storage facilities and manpower, Petroleum Coordinator for War Harold L. Ickes today called for discontinuance of the use of slow-curing road oil and requested that the number of grades of petroleum asphalts and surfacing materials manufactured for paving purposes be reduced from approximately 27 standard grades to 17. Coordinator Ickes said that the elimination of unnecessary asphalt grades also will tend to increase refinery through-out and eliminate hundreds of modifications of asphalt specifications.

Complete Alaska rail link survey

Surveys for a railway line from Prince George on the Canadian National Ry., in British Columbia, through British Columbia and Yukon Territory to connect with the Alaska R.R. at Kobi, about 75 miles south of Fairbanks, Alaska, have been completed by the Army Engineers, according to an announcement made recently in Seattle by Representative Warren G. Magnuson of Washington.

Prince George is in the broad valley between the Rocky Mountains and the Coast Range. Route "B" of the routes originally proposed for the Alaska highway started from Prince George and ran northwest to cross into Yukon Territory near Lower Post, continued north and northwest into the Yukon River valley, which it followed down to Dawson, and then turned across to Big Delta on the Richardson Highway from the coast to Fairbanks. If this route is followed by the railway, it will cross the Alcan Highway somewhere near Lower Post (*ENR*, Nov. 12, p. 671).

If Route "A" of the projected highway (*ENR*, April 2, p. 515) is followed by the railway, it will be much nearer the coast, running up through the valley between the Stikine Mountains and the Coast Range, intersecting the White Pass & Yukon R. R. at Carcross, and probably following the line of the Alcan Highway from Whitehorse in Yukon Territory to Big Delta in Alaska.

At the same time that Representative Magnuson announced the completion of the surveys, he said that the Army Engineers also are running surveys for a highway from Prince George over to connect with the southern end of the Alcan Highway at Dawson Creek.

New bill for public works planning

Designed to meet the objections that were brought out in hearings last fall on the Wagner-Beiter bill for financing the planning and designing of postwar public works, a new bill with the same purpose was introduced on Nov. 16 by Congressman Alfred F. Beiter of New York. Designated H.R. 7782, and called the "First Post War Planning Act of 1942", the bill was referred to the House Ways and Means Committee.

It would provide $25,000,000 for federal agencies and $75,000,000 for advancement to state and local agencies, for plan preparation. With respect to the federal agency appropriation, the bill expressly states that none of the planning shall interfere with the conduct of civil functions of the Corps of Engineers (a point that was raised during consideration of the earlier bill); and with respect to the state and local appropriation it is provided that any advances made for engineering and architectural plans of specific projects be repaid in full "if and when funds become available by reason of appropriation by, or grant, gift or loan to, such state or local agency for the undertaking of the public works and improvements so planned." For general investigations, surveys and comprehensive plans, local governments are required to contribute in funds, services or materials no less than 25 percent of the total cost.

The bill stipulates that all advances to state and local agencies are to be used for plan preparation "by staffs and consultants of such state or local agencies," a requirement not in the original bill.

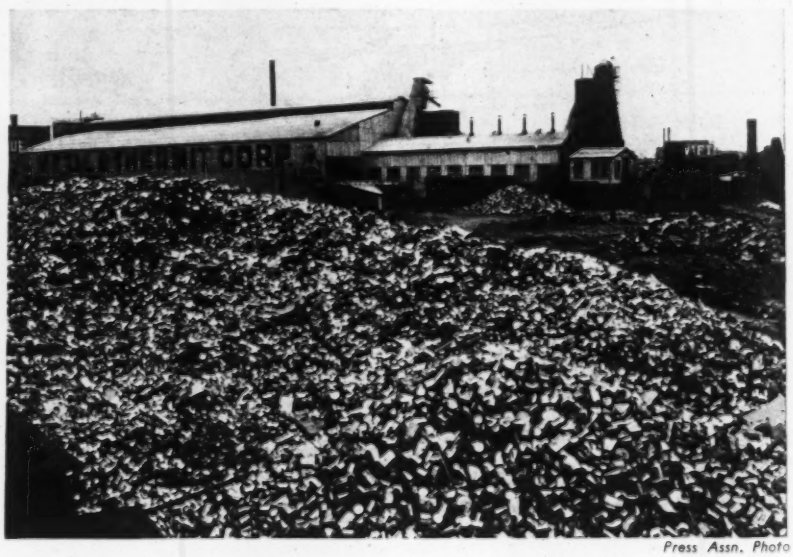
Under the provisions of the bill money will be advanced for local project planning by the President, and local requests for funds will be reviewed for the President by the Federal Works Agency, the Federal Security Agency, The National Housing Agency or "other appropriate federal agencies." Congressman Beiter estimates that the $100,000,000 provided in the bill will finance plans for three billion dollars worth of public works on the assumption that plan preparations would average about 3½ percent of the total cost of construction.

Toll fees ruled out for Covington-Cincinnati span

After the Kentucky court of appeals had ruled that tolls cannot be collected on a bridge after enough money had been taken in to pay for it, the Covington-Cincinnati bridge last week was opened to free traffic.

Attorney-General Meredith estimated that on Oct. 31 there was a balance of $182,000 on hand with which to pay off the remaining $128,000 bonds and interest due on Jan. 1. J. Lyter Donaldson, state highway commissioner, had contended that the surplus should be used to pay for improvements on the structure. Painting costing $10,000 and pavement improvements on the approaches in Covington costing $50,000 are now underway, according to Mr. Donaldson, and a contract has been let for $37,000 worth of lighting renovation to be started when materials can be obtained. In view of the court's ruling, said Commissioner Donaldson, 90 percent of this improvement cost will have to be paid by Kentuckians through the state gasoline tax, otherwise more than 57 percent would have come from nonresidents through toll charges.

Attorney General William N. McQueen of Alabama ruled recently that municipalities are authorized to create municipal planning commissions by ordinance only. The opinion was requested by W. O. Dobbins, Jr., director of the Alabama state planning commission, who asked if a municipal commission could be



Press Assn. Photo

Tin can mountain aids scrap drive

Contribution of a municipality toward the nation's attempt to obtain scrap metal to replace vital steel and tin in the war economy is this mountain of tin cans collected by the City of San Francisco, Cal., and piled up in a yard awaiting entrance to a detinning plant.

Two prominent New York contractors are dead

FRANK S. SENIOR, president of the engineering construction firm of Senior & Palmer, Inc., of New York City, died Nov. 29.

Specializing in railroad construction and pneumatic foundation work, Mr. Senior was formerly a vice-president of the firm of Arthur McMullen Co. He began his work with the McMullen company in 1899, serving it until 1929 when he organized the firm of Senior & Palmer.

A native of Montgomery, N. Y., he received his degree in civil engineering from Cornell University in 1896. His firm built foundations for bridges over waterways from South Dakota to New York, including such work as the foundations for the West Side Express Highway in New York City. His firm was one of two contractors that built Pine Camp, N. Y., for the U. S. Army.

During the first World War he was commissioned a major in the transportation corps and served for 18 months in France, receiving a citation for meritorious and conspicuous service.

FREDERICK SNARE, JR., secretary-treasurer and a director of the Frederick Snare Corp., New York City, contracting engineers, died Nov. 27 after an illness of a few days. Mr. Snare attended Columbia University and had been with the Snare Corp. for the last 30 years, holding executive positions since 1919. His company did contracting work in steel, concrete and other materials for many large projects, such as the Triborough Bridge, Whitestone Bridge, the West Side Highway, East Side Drive, and Chelsea pier in New York. Other large contracts were handled in Havana, Peru, Venezuela, Colombia and Panama. During the first World War he served as lieutenant in the 27th Division and was decorated for outstanding service.

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New road link planned for Nicaragua

President Anastasio Somoza of Nicaragua announced last week the signing of a supplementary convention with the United States, covering the construction of a road from San Benito, a point on the Inter-American highway, to Rama on the Escondido River.

The road, President Samoza said, will be hard surfaced, with the United States providing the necessary funds. He added that the importance of the highway to Nicaragua cannot be overestimated, since it affords quicker transportation between Nicaragua and the United States and also provides an important link in continental defense.

Herman Stabler, Geological Survey engineer, dies

Herman Stabler, 63, chief of the conservation branch of the U. S. Geological Survey since 1925, died at Washington Nov. 24, after a short illness.

Born in Brighton, Md., Mr. Stabler received his engineering degree from Columbian College, now George Washington University, in 1903, and served the National Correspondence Institute in Washington as an instructor in mathematics and engineering. A hydraulic and sanitary engineer for the Geological Survey and the Reclamation Service during the period 1903-1922, he became chief of the Land Classification Bureau of the survey in 1922, holding that position until 1925.

He was a former director of the American Society of Civil Engineers and a member of many other engineering and scientific groups. His numerous papers on disposal of waste of manufacturing establishments and recovery of products from them made him well known throughout the country.

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Highway traffic studies reveal 37 mph. average

Speed studies, which have just been made in 15 states since the institution of a national 35-mile-an-hour limit, show that the average speed of passenger cars on rural highways has been reduced to 37 mph. and that of trucks to 36 mph. The result of the studies has just been announced by the Public Roads Administration of the Federal Works Agency.

Maj. Gen. Philip B. Fleming, Federal Works Administrator, has expressed satisfaction with the public response to the new war speed limit. Said Maj. Gen. Fleming, "I am especially pleased because these low averages are largely the result of voluntary, patriotic compliance with drastically reduced speed limits. Very few states were yet in a position to enforce the 35-mile limit at the time these speed studies were made."

The new rates represent reductions from pre-war averages for passenger cars of 9 and 12 mph. in rationed and unrationed areas, respectively, Public Roads officials stated. Corresponding reductions for trucks are 4 and 6 mph. The 37 mph. for passenger cars and 36 mph. for trucks today correspond to 68 and 80 mph. in normal times.

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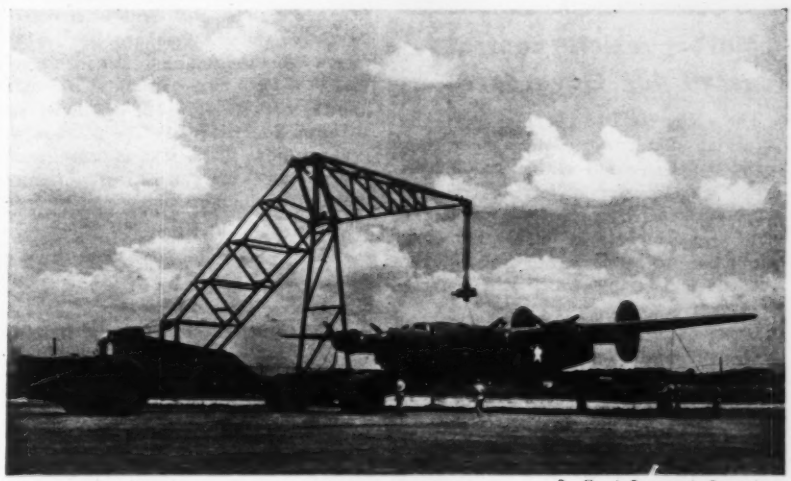
Little Rock district of U. S. Engineers expanded

The Little Rock, Ark., district office of the U. S. Engineer Corps will assume supervision of all military construction in Arkansas and Louisiana west of the Mississippi River and north of Red River, according to announcement by Col. A. M. Neilson, district engineer. After Dec. 1 it is expected that the work of this office will be tripled. In preparation for the additional work to be handled, the personnel of the office is being increased and additional office space provided.

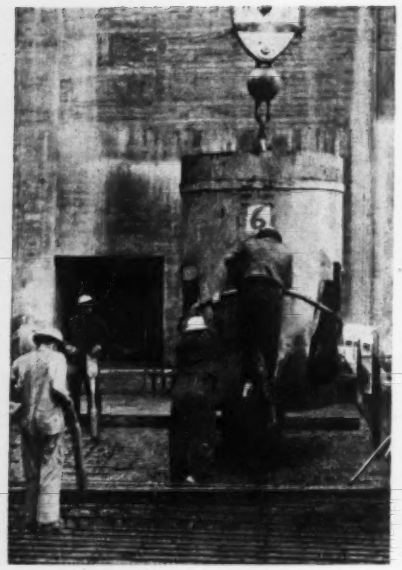


R. G. LeTourneau Co. photo

Giant mobile crane built for armed forces

An indicator of things to come in the heavy construction field is this photograph of a giant mobile crane, capable of lifting 35 tons.

The crane, powered by a supercharged diesel engine rated at 200 hp., was built to specifications provided by the army air force for use in quickly moving heavy equipment on the field. The entire crane weighs 130,000 lb., much of its weight being taken up by a huge metal counterweight behind the motor. The forward, or drive tires, are 30x40, while those on the rear of the crane structure are 24x32. Official capacity rating is 30 tons, but in tests the outfit has lifted 35 tons.



Complete powerhouse at Grand Coulee

Just two days before a War Production order revoking priorities on critical materials for the Grand Coulee Dam East Powerhouse (ENR, Nov. 5, p. 618), went into effect, the building was completed.

Constructed years ahead of schedule to house additional generators, should they be required for war use at some future date, the powerhouse will be fully equipped by the spring of 1944, according to the U. S. Bureau of Reclamation.

Concrete work began in April, 1938, and 6,060,680 cu. yd. were poured during the 4½ years of construction.

Motor vehicle control asked for Governors

The Office of Defense Transportation is urging that uniform state emergency legislation be passed conferring on Governors wartime powers for regulation of highway transportation. The Council of State Governments is being asked to adopt the project for presentation in the 44 state legislatures which will convene next year.

Specifically, the emergency authority proposed would include the following: Prescribe staggered hours of employment; regulate maximum rates of speed for motor vehicles; prescribe sizes and weights for motor vehicles; suspend the application of license fees or licensing requirements covering the entry of certain out-of-state vehicles properly licensed in another state; and direct the conservation of vital equipment, materials and supplies, particularly rubber.

Discussion of this and other proposals for wartime state control of highway transportation, in conformity with federal regulations, has brought the suggestion that all emergency restrictions of highway transportation should provide automatic repeal when the emergency has passed. It is pointed out that such expiration clauses will eliminate the necessity of further legislative action to return to normal regulation of highway transportation when the rubber shortage or the war has come to an end.

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Ohio submits postwar road program to PRA

A postwar highway program for Ohio involving the expenditure of several millions of dollars is now ready for submission to the Public Roads Administration, according to Director of Highways Hal G. Sours. When the program is placed before the PRA the highway department will submit at the same time a request for the release of $700,000 to pay for the surveys and for preparation of detailed plans for each of seven major projects now proposed by the department. Should this request be granted, the state will furnish half of the $700,000 and the federal government will provide the remaining $350,000.

The seven proposed projects were selected on the basis of their importance in eliminating the most critical traffic problems in the state, and were selected, said Director Sours, after several conferences with the representatives of the federal government. The program has been prepared and will be developed under the supervision of Murray Shaffer, chief of the highway department's bureau of location and design. Not until such time as the surveys and plans are finally completed can the estimated cost for each of the proposed improvements be determined. Everything is being done, said Director Sours, to have the postwar program in final shape just as early as possible so that work can be started immediately after the present conflict comes to an end.

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Mine subsidence damage placed at $250,000

Some 270 homes in the Pennsylvania coal field at Pittston were severely damaged on Friday and again on Sunday due to a mine subsidence over a vein that had not been worked since 1868. Sidewalks were torn up, gas and water mains smashed, water cascaded through the streets and flooded cellars, causing an estimated total damage of $250,000.

On Friday deep fissures, as much as 175 ft. long, covered a half mile square area, and on Sunday the subsidence hit a section two blocks east of the first site.

Form Engineering College Research Association

The formation of the Engineering College Research Association by 73 engineering colleges throughout the United States, to cooperate with war agencies and with war industry in the prosecution and promotion of research was announced recently.

Headed by Dean W. R. Woolrich of the College of Engineering of the University of Texas, the group held its first meeting recently at Washington, D. C.

The Association will coordinate the research activities of the engineering college laboratories and personnel. It will also assist in organizing the research facilities of the colleges in undertaking studies designed to promote postwar reconstruction and economic adjustment through new and improved processes affecting industry, public works, public health and similar activities.

It is further planned that the group will act as a continuing agency for developing and coordinating industrial and scientific research and the furtherance of advanced study in colleges of engineering.

In addition to Dean Woolrich, other officers of the new group are: Earle B. Norris, Virginia Polytechnic Institute, first vice president; C. C. Williams, president of Lehigh University, second vice president; R. L. Spencer, University of Delaware, treasurer.

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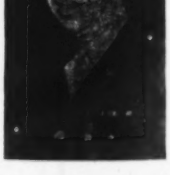
Engineer officer given army's D.S.M. award

Lt. Col. John S. Bragdon, chief engineer of the South Atlantic Division, Corps of Engineers, recently was awarded the Distinguished Service Medal for "exceptionally meritorious service."



The medal was awarded for Colonel Bragdon's service from May 13, 1941 to June 30, 1942, when he was in charge of a large building program for housing increased army personnel, construction of fortifications and airfields and other facilities.

Colonel Bragdon served as a captain in the Corps of Engineers in the first World War, and reached the rank of major at the end of that conflict.

ANTICIPATING a drop of about 40 percent in revenues, the Maryland State Roads Commission has asked an increase in its administrative expense budget for the 1944-45 biennium.

OBITUARY

David Edward Hughes, 82, retired civilian chief of the United States District Engineer's office at Los Angeles, and an outstanding figure in the realization of Los Angeles harbor, died Nov. 19. Retiring ten years ago, Mr. Hughes began his duties at the port when it was considered a "mud flat" and supervised completion of San Pedro's first breakwater in 1909 and its shore connection in 1913.

Oliver T. Hartline, 68, retired civil engineer of Tacoma, Wash., died there Nov. 16.

H. M. Gully, 42, civil engineer of Meridan, Miss., died there recently.

Leon Bly, retired civil engineer, died Nov. 21 at his home near Paynes Creek, Tehama County, Cal. He had been engineer on the Honey Lake Valley irrigation project in Lassen county, Cal., and various projects in Alaska and Mexico.

Charles Hudson Bull, 83, who recommended and supervised the repaving of all New York streets with asphalt and granite block on concrete, died Nov. 26. Borough engineer of Brooklyn until his retirement after more than 50 years of service to the city government in 1928, Mr. Bull served as paving engineer for Manhattan from 1885 to 1895, later served in water supply work in Manhattan and with the department of water supply, gas and electricity, and did other valuable work for the city.

A. R. Terwilliger, construction engineer for more than 30 years, died recently at his home in Wahoo, Neb.

Ray Carlton McLain, 55, former assistant engineer for the Nebraska state railway commission, died Nov. 23.

Richard Beadell, 60, retired builder and contractor of Berkeley, Cal., died there Nov. 20.

CONTRACTS AND CAPITAL

ENGINEERING CONSTRUCTION volume for the week, $103,143,000, tops the total for the corresponding 1941 week by 10 percent, and is well in excess of the $65,929,000 reported for the holiday-shortened preceding week.

Federal construction accounts for 93 percent of the week's volume and is 35 percent higher than in the week last year. As a result of the federal gain, public construction is 18 percent above a year ago, despite a 71 percent drop in state and municipal work. Private volume is 60 percent below the 1941 week's total.

The current week's volume brings 1942 construction to $9,035,350,000, an increase of 59 percent over the total for the 49-week period last year. Private construction for the period, $546,182,000, is 52 percent below a year ago, but public work, $8,489,168,000, is 86 percent higher due to the 134 percent gain in federal.

In the classified construction groups, gains over the 1941 week are in waterworks, public buildings, and unclassified construction. Increases over the short preceding week are in waterworks, industrial buildings, public buildings, earthwork and drainage, and streets and roads.

New capital for construction purposes for the week totals $3,008,000. This compares with $14,297,000 for the corresponding week last year. The current week's new financing is made up of $1,508,000 in state and municipal bond sales, $500,000 in corporate security issues, and $1,000,000 in RFC loans for public improvements.

New construction financing for the year to date, $10,207,263,000, is up 62 percent compared with the $6,296,594,000 reported for the 49-week period in 1941.

CONTRACTS

(Thousands of dollars)

	Week Ending Dec. 4 1941	Nov. 26 1942	Dec. 3 1942
Federal	$ 70,895	$ 53,507	$ 95,652
State & Municipal	13,488	3,733	3,853
Total public	$ 84,383	$ 57,240	$ 99,505
Total private	9,105	8,689	3,638
TOTALS	$ 93,488	$ 65,929	$103,143
Cumulative 1942	(49 weeks)		$9,035,350
1941	(49 weeks)		$5,692,498

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 48 weeks	1942 48 weeks
NON-FEDERAL	$1,345,476	$628,077
Corp. Securities	357,126	177,879
State & Mun.	405,609	210,043
U.S.H.A. loans	30,399	.....
R.E.A. loans	100,500	.....
R.F.C. loans	288,842	157,455
Fed. Aid—Highways	163,000	82,700
FEDERAL	4,951,118	9,579,186
TOTAL CAPITAL	$6,296,594	$10,207,263

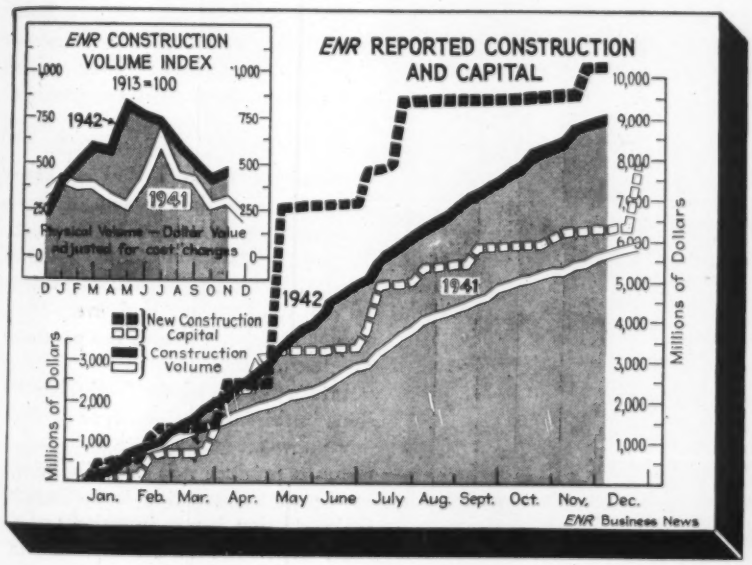
ENR INDEX NUMBERS

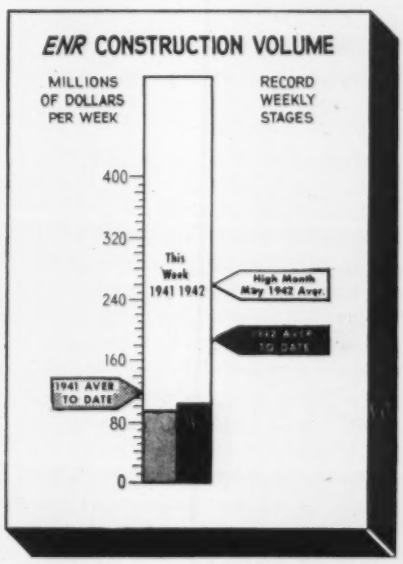
Index Base = 100		1913	1926
Construction Cost	Dec. '42	283.69	136.37
Building Cost	Dec. '42	226.63	122.51
Volume	Nov. '42	462	202

FHA MORTGAGES

	Week Ending Nov. 29 1941	Nov. 21 1942	Nov. 28 1942
Selected for appraisal			
Title II	$18,839	$5,024	$3,506*
Title VI	$4,264	$11,795	$7,332*

*Subject to revision.


ENR CONSTRUCTION VOLUME INDEX
1913=100
1942
1941
Physical Volume—Dollar Value adjusted for cost changes
D J F M A M J J A S O N D
ENR REPORTED CONSTRUCTION AND CAPITAL
1942
1941
New Construction Capital
Construction Volume
Millions of Dollars
Millions of Dollars
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
ENR Business News


ENR CONSTRUCTION VOLUME
MILLIONS OF DOLLARS PER WEEK
RECORD WEEKLY STAGES
This Week 1941 1942
High Month May 1942 Avgr.
1941 AVER TO DATE

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Young Men and the War

Sir: Your recent editorial "Young Men and the War" raises the question as to how much and what type of training the engineering schools should give during the war period. Few if any schools expect to continue normal programs. Many colleges have announced, as we did at Union early last May, that students could shorten their college course by one year by attending summer sessions developed for that purpose.

The final decision as to whether the three-year college program, a condensed two-year program or none at all is the appropriate thing would in my opinion depend on the estimated duration of the war. Unless the war is to be quickly won it would seem to me that sending 30,000 high-school graduates to college out of the 1,200,000 men expected to reach the age of 18 each year is not too high a price to pay for ensuring a supply of young graduates with engineering training. Our Canadian allies seem to have adopted this point of view. Their Wartime Bureau of Technical Personnel has, according to R. F. Legget's article in a recent issue of *News-Record*, taken steps to see that qualified students attend the Canadian engineering schools and that they acquire valuable engineering experience during the summer.

I heartily agree with your position that the Selective Service Act should be modified in such a way that men in training at the college should be on definite assignment during the period of such training. The decision as to who is to stay in college should be based on national needs rather than personal preference.

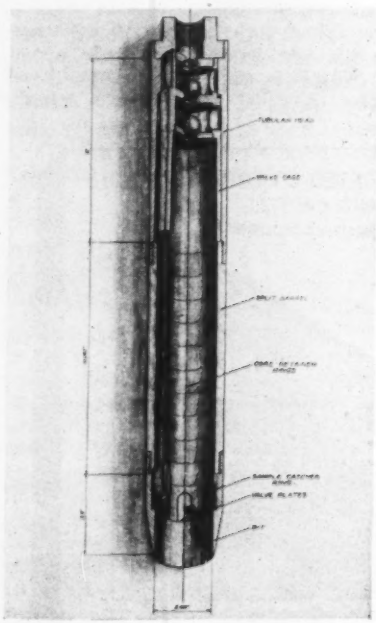
The pressure will undoubtedly be for a reduction in the humanities and a speeding-up of the program. In making these changes we should consider the urgency of the situation and the effect of the changes we make. If we were considering the elimination of the study of English we should remember that an order that is not clearly written may cause more serious damage than a misplaced decimal point. Unfortunately the process of learning is similar to the seasoning of wood in that it cannot be speeded beyond a certain point. But if necessity demands, a green timber is much better than none.

ANTHONY HOADLEY
Acting Professor of Civil Engineering
Union College, Schenectady, N. Y.

Soil Sampler

Sir—In the article entitled "New Sampler for Soft and Sandy Soils" by Henry D. Hammond (*ENR*, Aug. 27, 1942, p. 72), we heartily agree with the author's comment that in securing cohesionless samples with any of the generally accepted soil samplers it often happens that the material is so greatly compacted by overdriving that subsequent laboratory tests on the sample are very misleading.

We wish to call your attention to the fact that we have been using a sampler embodying somewhat similar principles on a commercial basis since March, 1940. In fact, we are inclined to maintain that the sampler designed by us possesses several advantages over that designed by Mr. Hammond. This sampling device, which was mentioned on page 704 of the December, 1940, issue of *Civil Engineering*, is illustrated by the accompanying oblique sectional drawing.



Details of soil sampler suitable for soft and sandy soils.

Among the advantages of our design is a lesser wall thickness in proportion to the inside diameter of the sampler, which, according to the present general belief, should result in less disturbance of the soil. We also believe that our sampler offers a great advantage in that the bore is of uniform diameter throughout and is entirely devoid of offsets, discontinuities or cavities between the catcher leaves into which the soil may extrude. Experience has shown us that extrusion of the soil into cavities in the barrel results in serious disturbance of the soil sample under many conditions of use.

Experience with our own equipment under severe conditions of usage leads us to believe that the spring leaves of Mr. Hammond's sampler are likely to be torn and damaged or even broken under many conditions of operation. Also, the bolt for the set screw in the section through the bit, shown in the lower left-hand corner of Mr. Hammond's Fig. 1, would be sheared off under many conditions of driving.

TRENT R. DAMES
Dames & Moore
Civil Engineers
Los Angeles

Why Not Non-Sinkable Ships?

Sir: This letter may seem a little out of place in your columns because it is not the story of an engineering achievement, but merely a suggestion for the future—something for engineers to work on.

It may be assumed that we have not yet reached the ultimate in shipbuilding. We think now in terms of the great ships we do build, but the ships of the future are still a matter of the imagination, and even that cannot visualize some of the possible wonders to come.

In view of the wholesale sinking of ships in this war—a new type of war—we now face the challenge to engineers to produce *non-sinkable* ships. Steel-plate construction is no longer the protection it was intended to be. After what has been accomplished in

chemistry, electricity, aviation, radio and many other fields, it is foolish to say now that the thing cannot be done. I have no suggestion to offer as to the *how*, but it seems possible to build ships of self-floating, non-combustible materials, perhaps even materials of such buoyancy as to keep water-filled ships afloat even with the machinery they contain.

The idea occurred to me some time ago, but this letter is precipitated by noting the item on "Cellular Glass Block," on page 84 of your own July 30, E.N-R., referring to the new product, "Foamglas," consisting of tiny air-tight cells, slightly vacuum in nature, giving this product a lightness that is one-fifteenth the weight of ordinary glass. A few years ago I encountered a product that was not sponge-rubber but a rubber cushion material made up of tiny rubber cells filled with nitrogen gas (accomplished by pressure treatment, I think), as if a room filled with toy rubber balloons inflated with nitrogen gas were reduced to microscopic dimensions. Also, we have metal alloys of great strength combined with lightness.

With every day new wonders in chemistry, fabricated materials and engineering advancement, we may find a product very strong and very light with which to build non-sinking ships, staying afloat in spite of damage and saving crews and passengers.

CARL EASTON WILLIAMS
San Pedro, California

Economical Timber Trusses

Sir: I read with interest the letter by G. L. Bilderbeck on "Economical Timber Trusses" in the Nov. 5 issue, p. 621. There are several discrepancies in Mr. Bilderbeck's letter and the following is an attempt to clear up a few points.

I disagree with Mr. Bilderbeck when he says, "the universal use of them (timber connectors) in simple roof trusses results in excess labor and material." A comparison of a connectored design prepared to replace a bolted design in the standards of the school house planning board of a southern state showed comparative costs of material alone of $43.71 for the connector-type truss as against $80.93 for the bolted truss, the bolted truss being twice as expensive as the connector type. Connector trusses in normal times as well as in war time have consistently run lower in cost than bolted trusses.

Granted that in the example cited by Mr. Bilderbeck the cost of fabrication with bolts would probably be somewhat cheaper than with timber connectors when handled at the job site, the overall cost of the structure, judging by past experience, would be greater with bolts due to the need of excess hardware and lumber. Further, the majority of wood structures now are being prefabricated. In this period of critical materials, both steel and lumber are saved by the connector method.

Mr. Bilderbeck states that the bearing of a 4-in. split ring and the bearing area of two 1-in. bolts would be approximately the same. This is correct, but the inference that equal load-bearing value would obtain is incorrect. The use of one ring indicates single shear, and according to values given by the National Lumber Manufacturers Assn., the ring would carry 5500 lb. as against 3620 lb. for the bolt. This is due to the bearing area of the ring joint being concentrated at the surface of the timber where the bearing is most efficient. The central bearing portion of the bolt is practically useless. A complete discussion of the reason for timber connectors and their efficiency would consume too much space. This information is available in government publications and in the literature of the Timber Engineering Co.

As regards camber discussed in detail by Mr. Bilderbeck, it is entirely possible to camber timber connectored trusses. This is being done by all reliable fabricators and builders. After the initial sag from dead load takes place little or no further sag is noted. The reason it was necessary to reintroduce camber in rod and block trusses was due in a large degree to the fact that they were continually loosening up.

In Mr. Bilderbeck' statement on the cost of a 50 ft. truss he neglects to state the pitch and the spacing. Both of which are very important factors and without them the price per lineal foot means nothing.

In closing may I say that in the U.S.A. over 75,000 structures using timber connectors have been built. These range from 20 ft. trussed rafters to 250 ft. framed arches. The system has been adopted by major engineering and architectural firms throughout the country as offering the best and most economical method of wood framing. Surely all of these engineers can't be wrong.

JAMES H. CARR, JR.
In Charge, Engineering Services
Timber Engineering Co.
Washington, D. C.

Wasted Engineer Talent

Sir: Reference is made to the letter of the Texas Society of Professional Engineers in the Nov. 5 issue, p. 620.

Let me tell you of my experiences. I get around a lot to army camp construction jobs and talk to soldiers. I find that the army is doing a lot toward aggravating the present shortage of engineers by inducting them into the army as privates—where many of these men stay—as privates. The army is a big family, but it is also a pretty rough one. The men who have the mental equipment to solve engineering problems are not necessarily the men who rise to the top in the army, where a brawny arm and a brazen throat are more useful than a skull full of brains. The mental processes of an introvert designer won't carry him far in an environment where an extrovert footballer would make officers school in a week.

I was working on one of the new synthetic rubber plants when a problem arose that I was sure was right down the alley of an engineer who formerly had worked for me. I ran him to earth in an army camp in Ohio—a private, or as his captain put it—a perfect permanent private. He designed some heat exchangers for me in his spare time. But he had no business being where he was; he had absolutely no leadership qualities, having spent the greater part of his professional career over a drafting board on design. His captain was quite right in keeping him as a private; he was in the army and his military abilities were that of a private.

Nor is this case the only one I could cite. If we've got to conserve our engineering manpower let's stop frittering them away in situations where they could be replaced by less critical men. Let's keep the engineers at engineering, and if they have leadership or military abilities as well, let the Army or Navy have them. This vital distribution of engineering ability could be done through the professional societies, or some other agency, but it should be done now.

ONE OF THE ENGINEERS

EDITORIALS

VOLUME 129 NUMBER 23

December 3, 1942

Protecting Piles

TWO NOTEWORTHY EXAMPLES of the ingenuity of engineers in meeting problems peculiar to marine construction are found in recent issues of this journal (*ENR*, Oct. 22, p. 544, and Nov. 5, p. 624). In the first instance, requirements on a Navy pier made precast piles almost a necessity, but underground conditions were so peculiar as to render accurate determination of pile lengths an impossibility. To cut off piles that proved to be too long would cause a waste of time and valuable materials. The ingenious solution was to cast piles of about the minimum anticipated length and then bring their tops to proper level after driving by use of a precast concrete jacket that could be telescoped over the end of the pile and filled with concrete. Also, this jacket, being in the tidal range, gave useful protection against the destructive effects of seawater. At the second job, which was for the Army, neither concrete nor treated timber piles being procurable, untreated timber piles had to be used, and protection against marine borers was obtained by a layer of shotcrete applied before the piles were driven. In both instances, the need for speedy construction and for saving materials required for the war forced engineers to resort to expedients that in the end added to our knowledge of how to combat the attacks of seawater and marine borers.

Using Approximate Methods

APPROXIMATE METHODS for solving intricate problems often prove to be more satisfactory than solutions reached by exact mathematical processes. Years ago, railroad engineers learned this when the string method for realigning compound curves was first introduced. The resulting curve might prove to be a nightmare to the draftsman who had to transfer it to a right-of-way plan, but its riding qualities were greatly improved as compared to a compound curve staked out with a transit. Much the same thing probably can be said for the method for staking out airfield grades described by Prof. B. J. Lambert in this issue. It is not an exact method, but it has the advantage of making possible quick visual determination of what are the most economical grades. And when it comes to complicated runway intersections, the method offers a simple solution for what otherwise would be a most difficult problem to solve by exact methods.

A Challenge To Be Met

NOT ONLY has the construction industry rediscovered timber as a structural material, but it has also discovered that there is a growing timber shortage. Because this shortage will continue to increase for some time, due to further reductions of manpower for timber production and an increased burden on all transportation facilities, American builders are challenged to use less timber, but to continue to construct well-built structures. In this issue a method is outlined which is claimed to permit a fifty percent saving by using timber rigid frames instead of timber trusses. This economy is, of course, possible only within a limited range of conditions. However, as the timber shortage becomes more severe, and a bit more time is available to compare timber demands for different designs, other means of timber saving can be expected. And thus, not only will the construction industry meet this challenge to save timber but it may well produce new designs that will command attention even after the war ends.

Laminated Construction

One result of the necessity to use more timber structures is the application of new techniques to designs that have their origin far back in structural history, for example, laminated timber construction. The laminated arch appeared in American construction practice soon after attempts were first made to bridge our major rivers. An outstanding example was the Waterford Bridge, built across the Hudson River above Troy in 1803 by Theodore Burr, in which he used the first, and probably the longest, of his famous trusses. These were a combination of timber trusses (180-ft. maximum span) and a pair of laminated timber arches springing from the stone piers below the trusses and rising to the top chord at midpoint. But the laminated arches of that day lacked the stiffness that fabricating methods of today make possible. Modern casein glues, ring connectors, and the control of shrinkage by kiln drying to a predetermined amount of moisture, even special methods of chemical curing, all have opened up new fields of usefulness for the laminated arch and the laminated beam. In the post-war period, steel will again take its rightful place as a structural material, and

aluminum and other metals doubtless will expand in application, but timber, too, will be a material to be reckoned with. Developments such as the modern laminated beam assure this beyond question.

Expediting Cooperation

FEDERAL RELATIONS with local units of government have changed so rapidly and have become so complex, it is easy to understand why many municipalities have found difficulty in taking advantage of certain types of federal aid. A case in point is the emergency sanitation improvement program whereby federal funds are made available for the needs of communities in war-expanded areas. The scope of this program and the manner in which it operates are clarified in a simplified questionnaire, with answers, prepared by the U. S. Public Health Service and published on p. 73 of this issue. Brief and concise, this form of presenting essential information goes a long way toward saving time and insuring intelligent local-federal participation in the war effort.

Keeping Up the Supply of Engineers

A PROPOSAL made in these pages in the issue of Oct. 22 that the teaching courses designed to make well-rounded engineers at the end of three or four years be abandoned for the duration of the war has been both condemned and endorsed by engineering educators. That is as it should be, for the proposal probably has as many bad as good points, but unfortunately few of the educators will permit their views to be made public.

How some of the educators feel who oppose temporary abandonment of formal engineering education in favor of intensive training of technicians for the armed forces and war industries are, however, summed up by Prof. Anthony Hoadley of Union College on a preceding page. He notes that 1,200,000 boys reach the draft age of 18 each year, and maintains that exempting 30,000 of these boys from the draft to permit them to take a full engineering training is not too high a price to pay for keeping up the annual supply of young engineering graduates.

This proposal for keeping up our present system of engineering education during the war period has many aspects, not the least of which is its social aspect. If our present system is to be maintained, the high-school graduate with latent engineering ability whose parents have the means to send him to college could thus escape the draft while a boy of similar ability but lacking financial resources would be drafted. Doubtless it was to offset such a possibility that Dean Thorndike Saville of New York University urged war-time subsidies for high-school students showing engineering aptitudes (*ENR*, Oct. 1, p. 451).

But the important aspect for engineers to consider is the matter of keeping up the supply of engineers. Will a short-time abandonment of complete training, requiring three years under the speed-up now in effect in most engineering schools, leave the nation short of engineers for the future? We ventured the opinion that it will not, based on the experience of the last World War. After the armistice, hundreds of young engineers accepted the opportunity offered to men in France to attend the Sorbonne and other schools. And a great many more went back to college in this country to complete their education.

Also, as against a plan to continue normal training programs for engineering students—or other specialists such as doctors and dentists—three fundamental facts can be set down: First, if the war is to be won quickly we must have a big army of young men; second, if the war should last several years, the current rate of induction into the armed forces will not be maintained but will decline to that required for replacements, thus opening the door for renewal of more normal training methods; and finally, this nation was built with doctors, teachers and engineers lacking formal education, so that in an extreme emergency we could go back to that condition confident that our progress would only be impeded thereby, not *destroyed*.

The nation needs the engineering schools today as it has never needed them before. But the need is for training technicians to meet requirements of the armed forces and war industries and for the retraining of older engineers for new types of work in the war industries. How best to meet this need stands as a challenge to our engineering educators. The supply they must now concentrate on is the supply for today; before the war ends there will be time to plan for making up the temporary deficiencies in the future supply of engineers that necessarily must result from today's needs.

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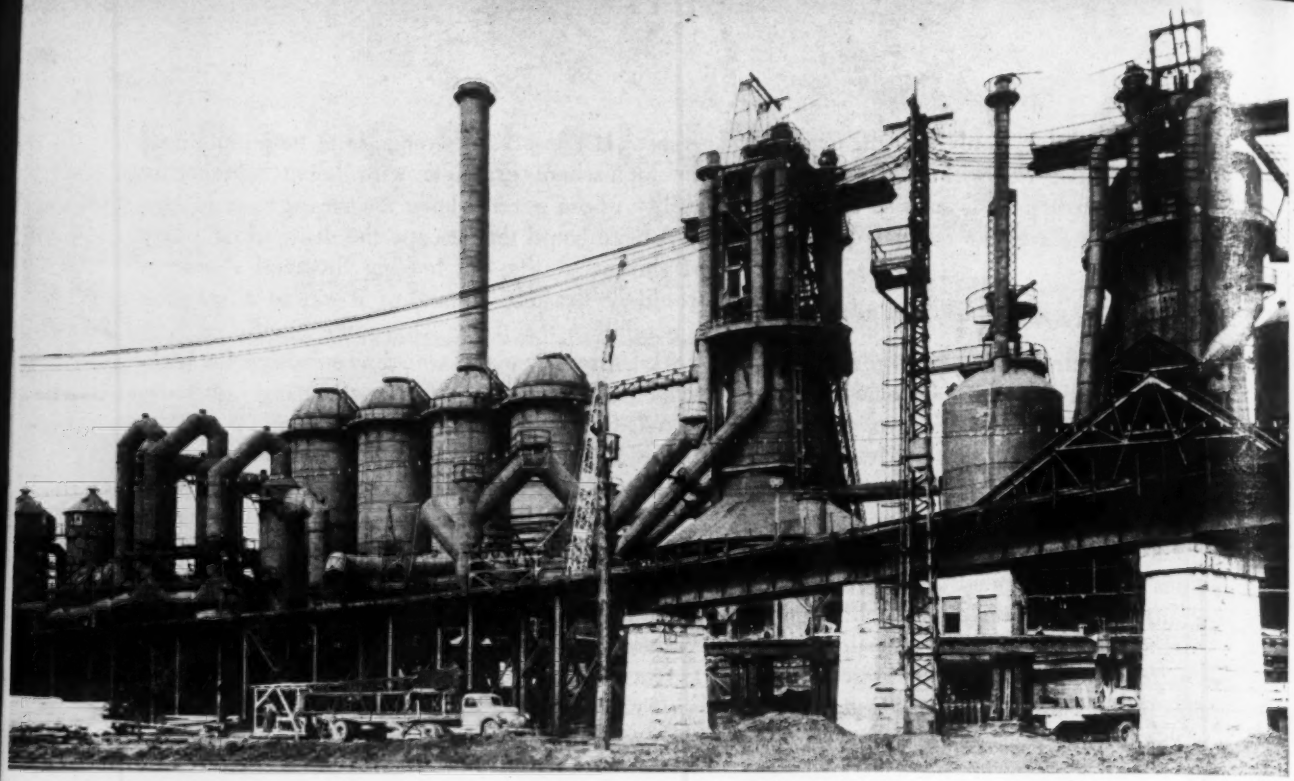


Fig. 1. Two blast furnaces and part of their equipment before dismantling at Joliet.

Blast Furnaces Dismantled and Moved

***Contents in Brief**—Two blast furnaces and all their appurtenant equipment, idle since 1932, are being dismantled in Illinois, for shipment to other points where they will be rebuilt and put into service. One, with the stockhouse and boiler plant, goes to the Columbia Steel Co., in Utah; the other, with a boiler plant from Indiana, goes to American Steel & Wire Co. in Minnesota. Biggest job is reconditioning worn and corroded parts and working new materials in with the old. Each part and member is carefully marked for return to exact former position in the plant. Accounting and paper work are heavy in keeping track of thousands of items.*

BUILDING for war production has resulted in many unusual construction projects, but none has been more interesting than that of dismantling two idle blast furnaces at Joliet, Ill., and shipping one to Utah, and the other to Minnesota, for rebuilding as serviceable units in iron and steel plants. To those unfamiliar with blast furnaces this sounds like a simple procedure, but in reality it is a most complicated job, involving the dismantling, inspection, reconditioning, shipping and reassembly of thousands of items. Keeping track of these items and allocating their cost of handling requires a vast amount of paper work.

The job is further complicated by the fact that the two original furnaces were interconnected and many of their appurtenances were joint facilities for serving both units, such as the stockhouses (where coke, ore and limestone are loaded into skip hoists for charging the furnaces) gas scrubber, blowing engine and generating plants, boiler plants and skull cracker for breaking up scrap. Thus, the old plant could not be simply cut in two and half shipped to each of the new locations, but certain appurtenant facilities could be sent to one plant only, to be supplemented by parts obtained elsewhere. About 60 percent of the Joliet plant goes to Utah, 40 percent to Minnesota.

The work is being done for the Defense Plant Corp., which is enlarging the new steel plant of the Columbia Steel Co. in Utah, and the American Steel Wire Co. plant in Minnesota. These are both United States Steel Corp. subsidiaries, and the operation has been simplified somewhat by the government granting full powers to each subsidiary "to act for and on behalf of the Defense Plant Corp." Yet, as each firm is a separate corporation, two sets of accounts and separate payrolls must be kept.

The decision to use the idle furnaces, owned by the Illinois Steel Co., another U. S. Steel subsidiary, was based first on the need for speed, and second, on the difficulty of getting new materials for new furnaces. By utilizing the old structures the furnaces can be put into service in seven to nine months after start of work, while about two years would be required to build new furnaces. Then, too, it would be almost impossible to obtain many materials, parts and machines under present critical shortages. The cost is somewhat less than that of building new plants, but of course the rebuilt furnaces will be

second-hand units, partly obsolete according to present standards. Day & Zimmermann, Inc., are consulting engineers on the project; Bates & Rogers Construction Corp. is general contractor.

Original plant built 1904

The original furnaces at Joliet were put into service in 1904, built from plans that dated back as far as 1898. They were each rated at 800 tons per day capacity. Gas flues and air blowing mains were interconnected. Each furnace was served by four stoves, high cylindrical tanks in which the blowing air is preheated, and each was charged by its own skiphoist. All other facilities were common to both furnaces. These included: (1) the stockhouse, containing unloading tracks and storage bins for ore, limestone and coke; (2) gas scrubbers; (3) blowing and generating house, containing reciprocating steam engine blowers and generators; (4) gas-burning boiler house for furnishing steam to the engines; (5) skull cracker for breaking up scrap; and (6) many smaller facilities, such as, for example, pump houses and scale houses.

The buildings, such as boiler house and generating plant, are steel frame with Joliet stone walls and concrete foundations and floors. Only the steel frame, metal roof covering and sash of the building structures are being moved, but it is necessary to demolish most of the foundations and floors to get at much of the piping and machinery.

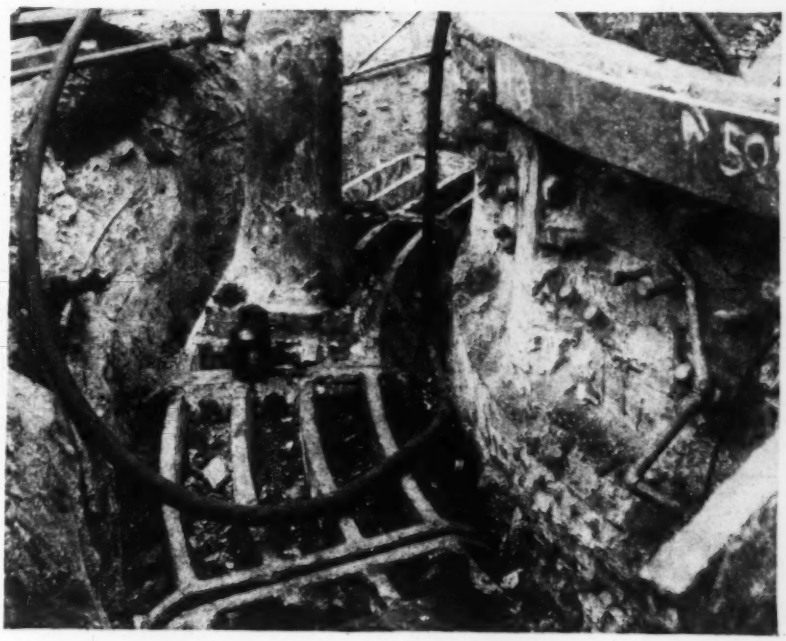
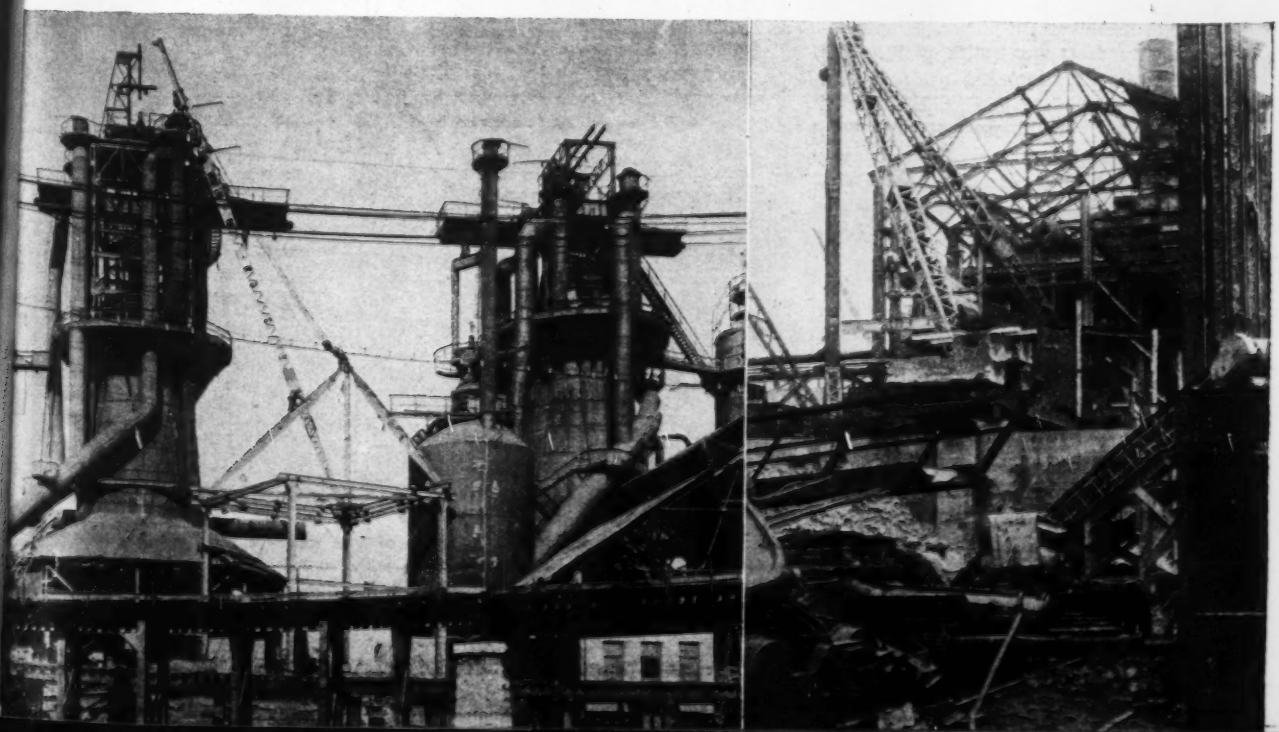


Fig. 2. Heavy demolition procedure was required to get at the hearth jackets and furnace supports buried deep in concrete.

Because the project in Utah is a new separate unit, it is necessary to equip that plant with a complete furnace. Therefore, most of the joint-service equipment is going along with the Utah furnace, including the boiler plant and house, the stockhouse, two of the four blowing engines, half the generators, the blowing and generating building, and probably the gas scrubber and skullcracker, though final decision on the last three items has not yet been made.

In Minnesota the Joliet furnace will supplement an existing blast furnace, and will replace a smaller furnace alongside an existing one torn down several years ago. Thus, many of the joint facilities are already there. The present stock house will serve both furnaces, the gas and elec-

Fig. 3. Dismantling under way. Left: High-frame stiffleg derrick at work on the furnaces. Right: Another derrick takes down the boiler house. Masonry debris is loaded for disposal by belt conveyor.



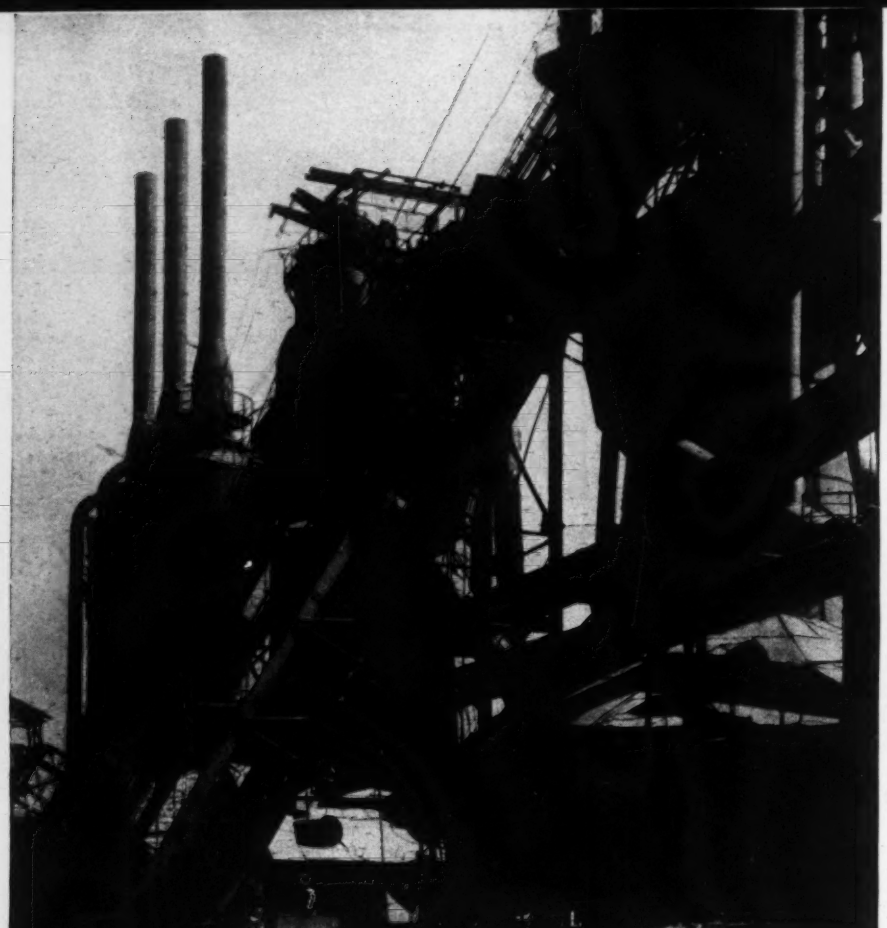


Fig. 4. All this had to come down, too. Skip charging hoists, with one set of stoves in the background.

tric building is large enough to house the engines, blowers and generators coming from Joliet. However, the existing engines in Minnesota are all gas operated, as no steam boiler plant for blowing engines has ever been built at that plant. As the Joliet engines are all steam power, it is necessary to install a boiler plant. The Steel Corporation met this problem by dismantling an old boiler plant at Anderson, Ind., and shipping five 800-hp. boilers and the building framework and piping to Minnesota. These boilers will be equipped for burning blast furnace gas, oil or coal.

Dismantling and shipping

The shipping list gives some idea of the magnitude of the project. That part of the plant going from Joliet to Utah amounts to about 175 carloads. Some 110 carloads of plant are being shipped from Joliet to Minnesota, and another 40 cars are required to move the Anderson boiler plant. In addition, about 200 carloads of brick for lining will be required for each furnace.

Both furnaces were shut down late in 1929 and have not been operated since that time. One had just been relined, and was never charged, so it was in good condition for dismantling. The other, however, was full of slag and partly fused metal, just as it had been left after tapping off most of the molten iron. This meant breaking up and removal of tons of debris in addition to taking down the structure.

A vertical traveler, 30 ft. square and 60 ft. high, carrying two booms good for 25 tons each, was erected between the two furnaces for dismantling them. The heaviest single pieces to handle are the 35-ton girders that support the charging equipment at the top. As the furnaces come down, a high-frame stiffleg derrick replaces the traveler.

For dismantling the two sets of four stoves, a Chicago boom was fastened to the side of the high steel stack in each set. The stoves are simple, being made up principally of curved plates, though removal of the intricate brickwork inside is quite a job.

Long-boom crawler cranes, one mounted on a flat car, handle the building structures and also sort and load the parts. The building service cranes are utilized in removal of the heavy machinery. Engines, boilers, blowers and generators are dismantled for easier handling and for inspection.

Furnaces, stoves and steel frame buildings are all riveted and bolted construction. Pneumatic rivet busters knock the heads off the rivets, then the rivets are backed out. Bolted connections are unbolted where possible, but many are corroded and must be burned off. In all cases care is used not to damage the connected parts any more than is necessary.

The engineering in this project is both complicated and exacting. All

Fig. 5. Steel frame and roof covering of gas and electric building being dismantled for shipment to Utah.

drawings from which the original plant was built are from 40 to 50 years old. Yet from these drawings the engineers must prepare new plans for the reconstruction work. The contractor works from a conglomeration of old and new prints.

As each piece and part is dismantled it is carefully marked with a corresponding number on the drawings, and is noted in card index files kept by both the engineers and contractors. Adjoining parts are all match-marked so they can be reassembled in their exact original position. Pieces going to Utah are marked with red paint, those bound for Minnesota with yellow. The same colors are maintained in making notes and markings on the drawings.

As each item is taken down it is carefully inspected by the engineers, who must decide at once the amount of reconditioning, reworking or rebuilding necessary to put it back into service. Of course some pieces are corroded beyond use and must be scrapped and new parts prepared or ordered. Others require new parts, perhaps an angle or piece of plate. However, most of these items, probably 80 percent or more, need only cleaning up, such as removal of rust or scale.

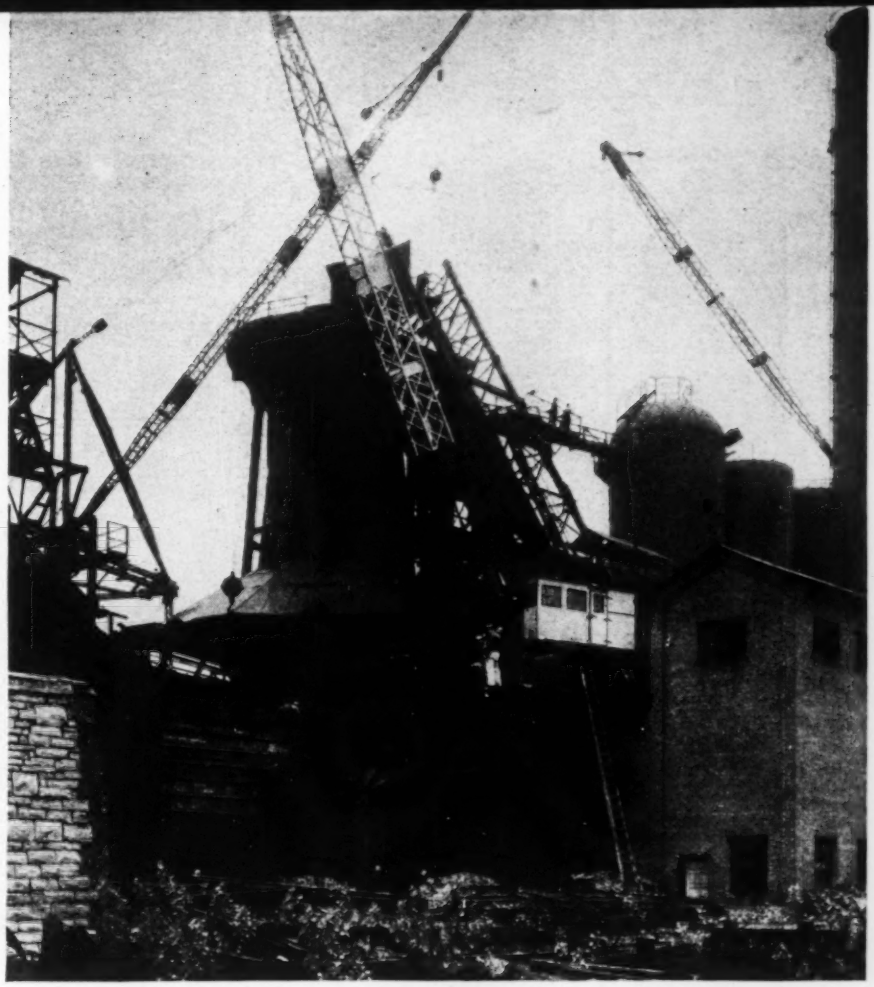


Fig. 6. An array of large cranes and derricks dismantling furnaces and stoves.

Reconditioning a major item

Reconditioning the various parts is one of the biggest items in the contractor's job. Machine, engine and big valve parts are carefully cleaned up by wire brushing, chipping and grinding. All small fittings, motors, valves, etc. are sent back to the original manufacturers, if possible, for reconditioning. This feature of the work alone requires an endless amount of record keeping and accounting. Each item must be marked, on both plans and the piece, where it came from and where it is going in the final assembly. Then when it is sent out for overhaul, careful records must be kept as to where it went, and proper shipping instructions given for it to reach its final destination. Then, of course, proper accounting charges must be made up for these thousands of items. The various items are now scattered from Utah to Massachusetts.

Larger machine parts, such as engines and the big valves, are sent to machine shops. Those parts for the Minnesota plant are sent to the plant shop there, but as no corresponding facilities exist at the Columbia plant, the Utah items must be handled through commercial shops. Finding facilities for reconditioning heavy machine parts today is quite a job. Face plates, flanges and big valve seats are milled down to a new finish. This complicates reassembly, as it changes the original dimensions enough to upset the piping plans.

Plates, pipe, structural members and castings are reconditioned at the yards in Joliet and in Minnesota.

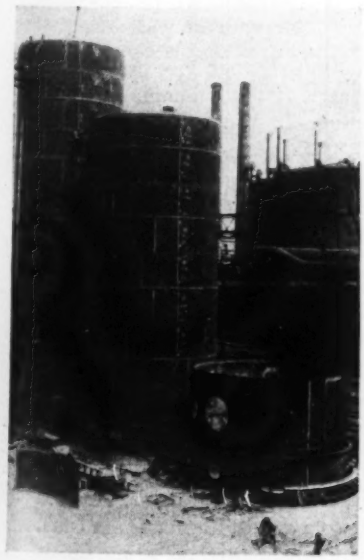


Fig. 7. Three reconditioned stoves being erected on the Minnesota project.

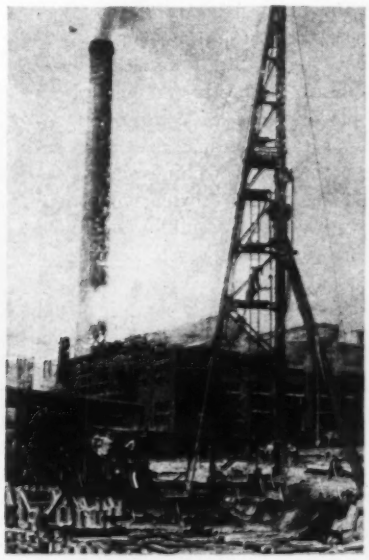


Fig. 8. In Utah, pile driving required re-excavation through tubes.

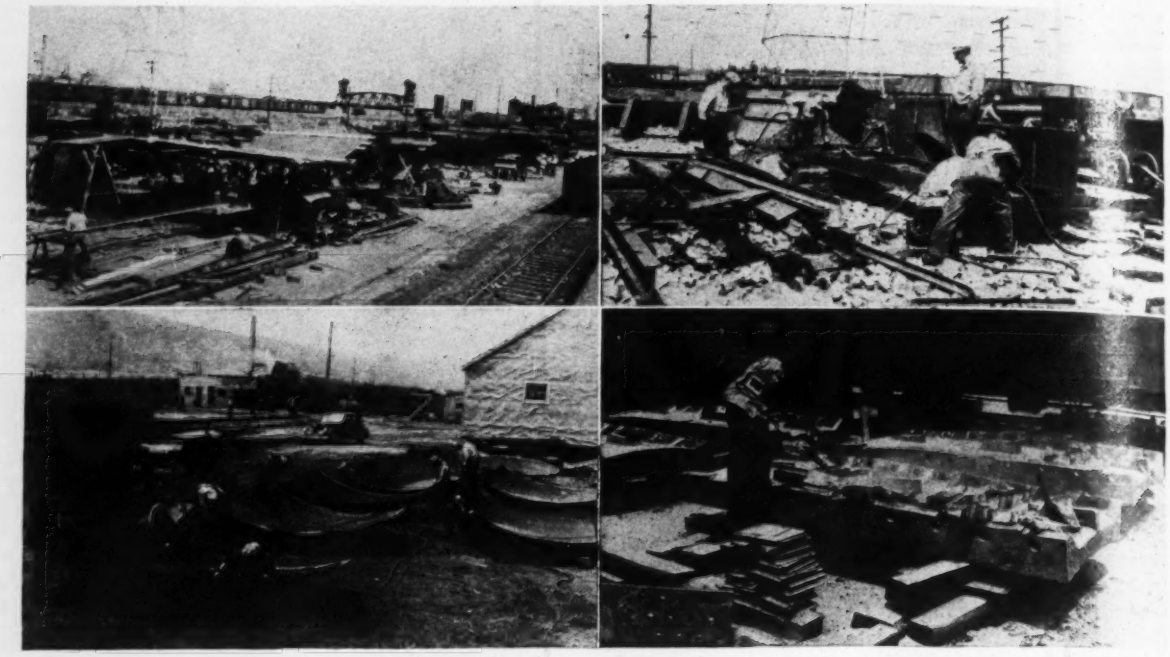


Fig. 9. Reconditioning of worn and corroded items is biggest job of reconstruction. Upper left: Field fabricating shop at Joliet. Right: Riveting up a new girder at Joliet fabricated from scrap. Lower left: Grinding and chipping high spots in cupola plates at the Minnesota site; corrosion left high areas around rivet holes. Right: Cleaning heavy castings by sand blasting in Minnesota.

Rust and scale are removed by chipping, wire brushing and grinding. All castings and other heavy parts are cleaned by sand blasting. On some of the heavier plates corrosion between rivets has left high spots around the rivet holes, which are reduced by grinding. Field welding and riveting facilities have been set up for rebuilding the pieces where necessary.

Reconditioning operations are always subject to change. For example, decision might be made to work some new material into a certain unit, then later it is learned the required material is not available. Then the piece must be re-inspected and efforts made to salvage those parts once thought useless. Considerable amounts of replacement parts are being salvaged from larger scrapped pieces.

At the new plants the pieces are kept segregated in carload lots as received until used, and the card records are made up accordingly. Seldom is it possible to keep adjoining and interconnected parts together when loading, for they must be distributed to make up full car loads.

Reconstruction measures

Construction and assembly of the new plants are getting well under way, but are further along in Minnesota because that furnace was the first dismantled at Joliet. New foundations must be built, which require considerable excavation and concrete work. Erection of steel building framework, the stoves and lighter structures is being done largely with long-boom crawler cranes. Probably some kind of vertical traveler, similar to that used for dismantling, will be used for furnace erection.

In Minnesota a ticklish job was tearing out of old foundations and installing new ones for the generators and blowers, for these units are going into the building already occupied by similar machines in operation. Wet drilling, extensive use of water sprays and carefully controlled blasting were necessary to keep down the dust.

Foundations at the plant in Utah are complicated by the presence of a soft, plastic ground that requires piles. About 3,500 composite piles, 40 ft. of wood topped by 20 ft. of concrete, are being driven to support the various units. However, pre-excavation for every pile is necessary to prevent heaving of the surrounding ground and piles during driving. A 20-in. steel tube, open at the bottom, is driven about 20 ft. into the ground at each pile location. As the tube is pulled, the encased soil comes with it, leaving an open hole that remains unsupported long enough to prepare a group of holes in advance of driving. After the tube is pulled, the driver swings around in the clear and the soil is ejected by applying steam pressure to the closed top of the tube. Three big skid drivers are at work on the foundations.

Direction of work

E. Milton Barber, vice president, is in charge of the Columbia Steel Co. activities. In Minnesota, B. E. Pheneger, manager of operations for American Steel & Wire Co. is in charge, acting for H. B. Jordan, vice president. F. W. Lorig is chief engineer for the Minnesota project, and A. J. Hulse is chief engineer for the Columbia Steel Co. project.

For Day & Zimmermann, Inc., consulting engineers, Philadelphia and Chicago, Jay J. Seaver is general supervisor. Bates & Rogers Construction Corp., Chicago, are general contractors. John W. Rogers is project manager at Joliet, Roy E. Ross in Minnesota and R. Rasmussen in Utah. The Cleveland Steel Erecting Co. is subcontractor on steel dismantling and re-erection.

Timber Bowstring Trusses Supported On Buttressed Concrete Columns

***Contents in Brief**—Bowstring timber arch trusses of 160- and 75-ft. spans are set on high, buttressed concrete columns to support the roof for a hangar. The top chords of the arches are two parallel stacks of small members, bent to the roof radius, glued and spiked together. The bottom chord is a pair of heavy timbers, spliced for tension. Ends of the hangar are inclosed in sliding door for the full 160-ft. span; doors are built in eight sections, each section sliding into side pockets.*

Bowstring Timber Trusses of 160-ft. span are used to support the roof of a hangar under construction near an eastern city for the U. S. Army. The trusses, at 19½ ft. c. to c., are supported on buttressed columns of reinforced concrete to provide a vertical clearance of 35 ft., sufficient for almost any aircraft. Adjacent to the main hangar a 75-ft. wide area, under a shorter bowstring truss, provides shop and work room space. A mezzanine under part of the shorter trusses adds office floor space. The trusses for both spans are similar in design and construction, using job-fabricated and assembled members.

The 160-ft. span truss has a top chord of two parallel stacks of nine 2x6-in. random length pieces bent to a 170-ft. radius, then glued and spiked together. The lower chord is two 6x12-in. pieces, and the diagonals and verticals are single 6x6-in. timber members that serve as spreaders for the truss parts. Corresponding members in the 75-ft. truss are two stacks of six 2x4's, two 4x8's and 4x4-in. braces. At the ends of the trusses steel bearing and connecting plates are used. (Fig. 2). The bottom chord is cut short to permit the curved compression member to bear directly on the truss shoe.

Purlins of 2x12's at 24 in. c. to c. span the 19½-ft. width between trusses. Sheathing over the trusses is 1x6-in. D.&C.M. (roofers) covered with 1-in. fiber board insulation and 10-year built-up roofing.

The outside walls of the building, where there are no openings, are diagonally sheathed with 1x6-in. lumber over 2x6-in. studs. Asbestos cement siding $\frac{3}{16}$-in. thick is used in 8x4-ft. sheets for the exterior covering. Glass is employed extensively in the exterior walls between the buttressed columns, as shown by an accompanying illustration. The upper sash is fixed in position, but that at the lower level is double-hung to provide ventilation. All the sash and frames are of wood construction.

The trusses are designed for a vertical live-load of 22.5 lb. per sq.ft., making a total roof load of about 38 lb. per sq.ft. Wind loads on the projection of the curved surface is taken at 12 lb. per sq.ft. with a 20-lb. direct wind load on the horizontal areas. The specifications required that a grade of lumber shall be used to provide minimum strength in pounds per square inch as follows:

Compression parallel to grain	1,000
Extreme fibers in bending	1,200
Modulus of elasticity	1,600,000

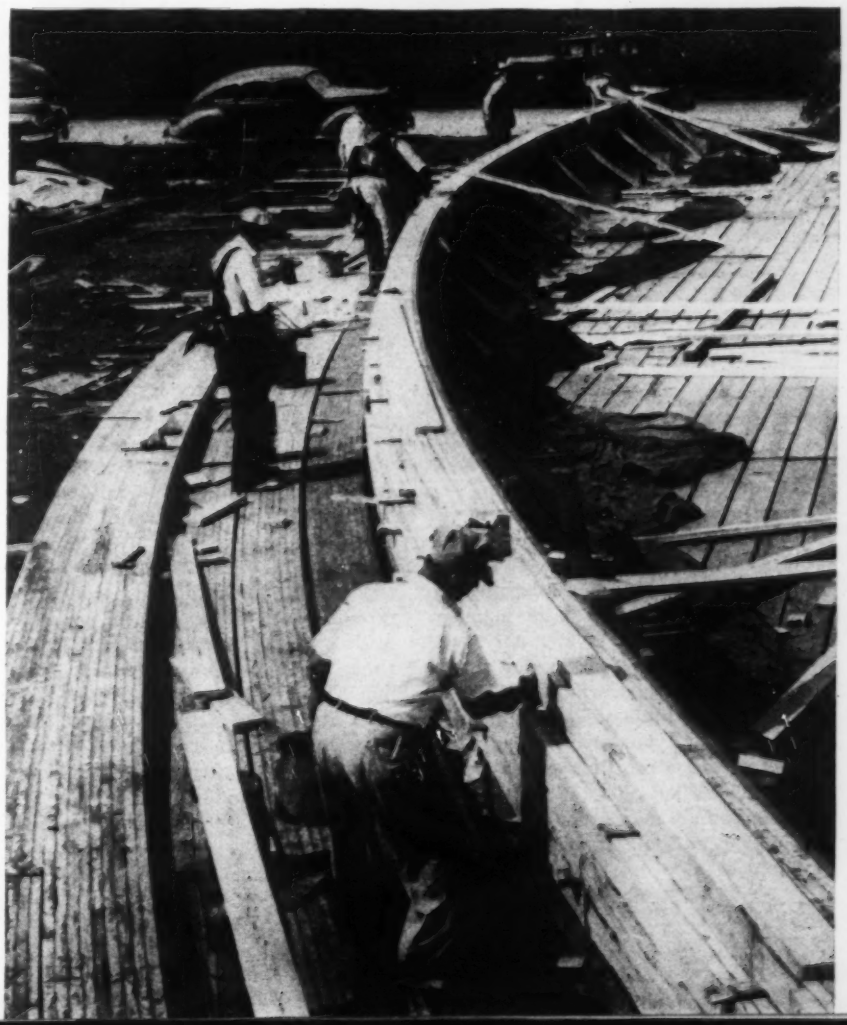


Fig. 1. Top chord of 160-ft. bowstring roof-truss is built up of laminated, glued and spiked small members.

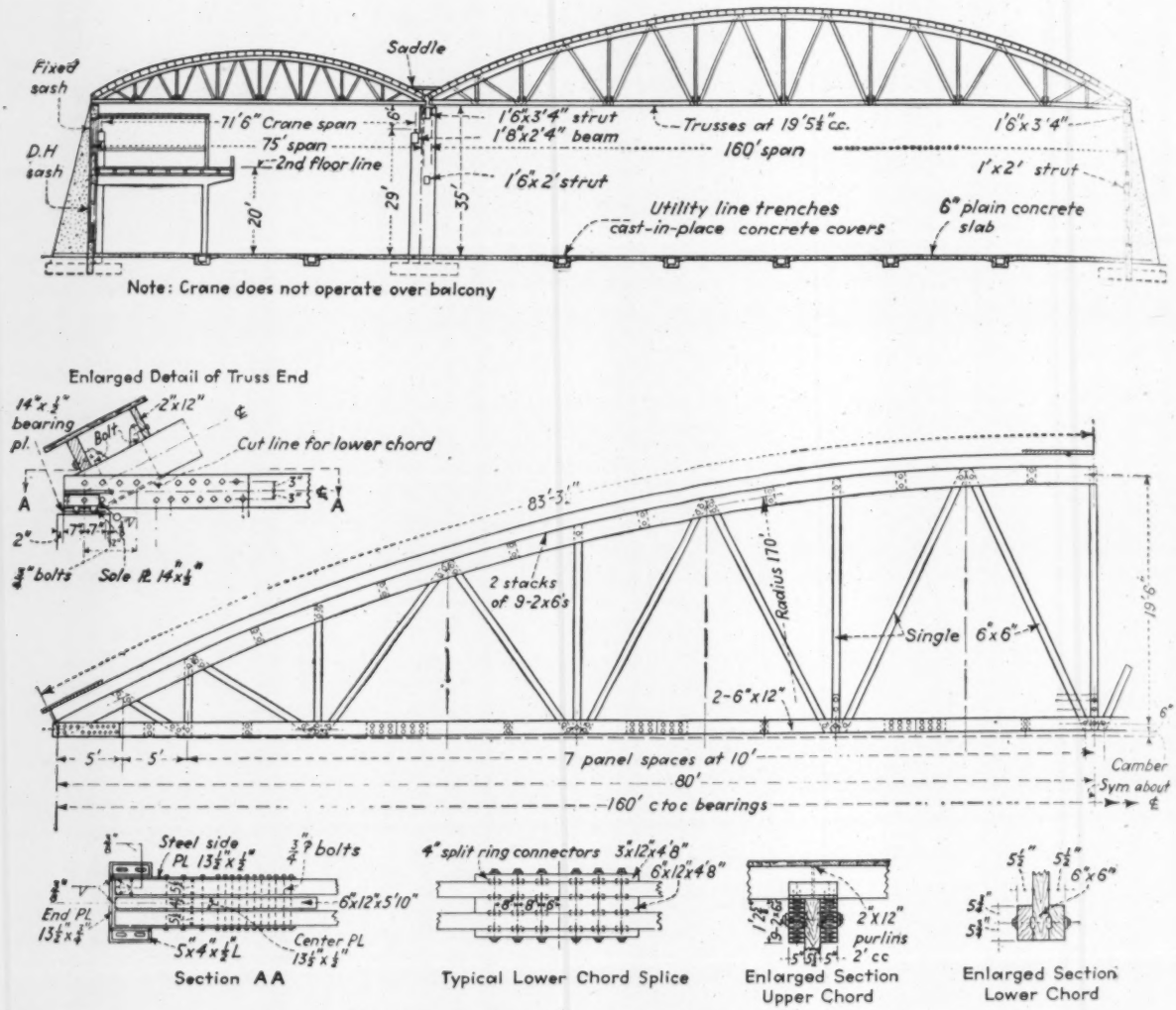


Fig. 2. Hangar with main span of 160 ft. and side span of 75 ft. has high buttressed columns carrying bowstring truss for roof support. Laminated stacks of 2x6-in. pieces for the top chord, two 6x12-in. timbers for the bottom chord and 6x6-in. combined spreaders and bracing make up the truss.

The compression members are further limited to an l/r ratio of 50.

Glue and spikes for top chord

The top chord of the longer truss has a radius of 170 ft. and a length around the arc of 166 ft. 7 in. The two stacks of nine 2x6's are assembled separately in lengths of about 111 ft.; this length is cut in two sections, and three such pieces later assembled to make the full length of the member.

In fabrication a template, well braced to the proper radius, is set above a work platform. The flat side of a 2x6-in. timber is set against the template and one end of the piece held to the end of the template with a wedged clevis. The board is bent around the radius, and nailed with duplex-head nails driven from the template side to hold it securely. Casein glue is applied cold to the exposed side of this member and to one side of another board. The second piece is then pulled up to tight contact with the first and spiked to it with 20-d. nails, staggered side to side of the piece, at 12 in. c. to c. Random length pieces are added until the required length and depth of the upper chord is obtained.

The bottom chord and secondary members of the truss are pre-cut, drilled and grooved for connector rings on a mechanized fabrication line. This line is equipped with radial saws and power drills to do all the work to an exact template. A wood roller conveyor carries the members along the machine line.

The trusses are assembled flat on "horses" on the apron in front of the hangar; steel truss shoes are attached and the unit made ready in this position for erection. Dollys are used to roll the trusses into the hangar to about where they will be set. Next, two long-boom cranes pick up the entire 160-ft. truss and set it on the bearing plates previously prepared on top of the concrete columns. A single crane sets the 75-ft. trusses in the same way.

After erection of the trusses they are braced for rigidity. Two 3x6's are placed just above the lower chord, and spliced continuous through the length of the building, being bolted on each side of, but not through, the vertical members of the truss. Diagonal braces, placed between alternate pairs of trusses, are single 3x6's bolted to the pair of longitudinals just outside the truss. They are connected to the panel-point vertical just

below the top chord by a 3-in. thick timber gusset plate.

Lateral bracing is also provided between the lower chords of adjacent trusses in each sixth bay. These members are 3x6's lag-screwed to the top of the bottom chord of the main truss.

High buttressed columns

The trusses are carried on lightly reinforced, buttressed columns extending to 36 ft. above the footings. Typical footings, columns, and the small amount of reinforcing used are shown in Fig. 4. A stiffening girder at mid-height and another at the top of the columns connect the concrete frame for stability.

Forms used for placing the concrete columns are vertical 1x6-in. sheathing with $\frac{3}{16}$-in. thick lining of pressed wallboard. The studs are horizontal 2x4-in. pieces and the wales are double 2x4's with wire snapties at a varied spacing to suit the expected pressure from the concrete. The column forms are used an average of four times; a considerably greater number of uses is possible with the lined form, but speed required placing a fourth of the structure at one time. The columns were placed in two lifts, first to the beam at mid-height of the span and then to the top.

The column forms for the top lift are assembled on a platform, the reinforcing steel set in them, and the assembly then swung into place by a crane. The platform used for assembly is large enough to permit preparation of four forms at one time and it is mounted on skids; dragged along to where it is to be used, it is blocked up and leveled exactly so that the forms can be plumbed and squared-up rapidly. The concrete is supplied by truck mixers from a commercial plant and placed by crane and bottom-dump bucket.

Sliding doors are two-thirds glass

Doors, 30 ft. high and in eight 20-ft. sections, slide horizontally to open the entire area under the 160-ft. trusses. The doors have a steel frame, but about two-thirds of the area is glass. Three double-flanged wheels, set in the 6-in. width of the frame in each 20-ft. section, carry the door on a rail embedded in the concrete of the floor. At the top, rolling track guides keep the door in line and provision is made, by use of threaded

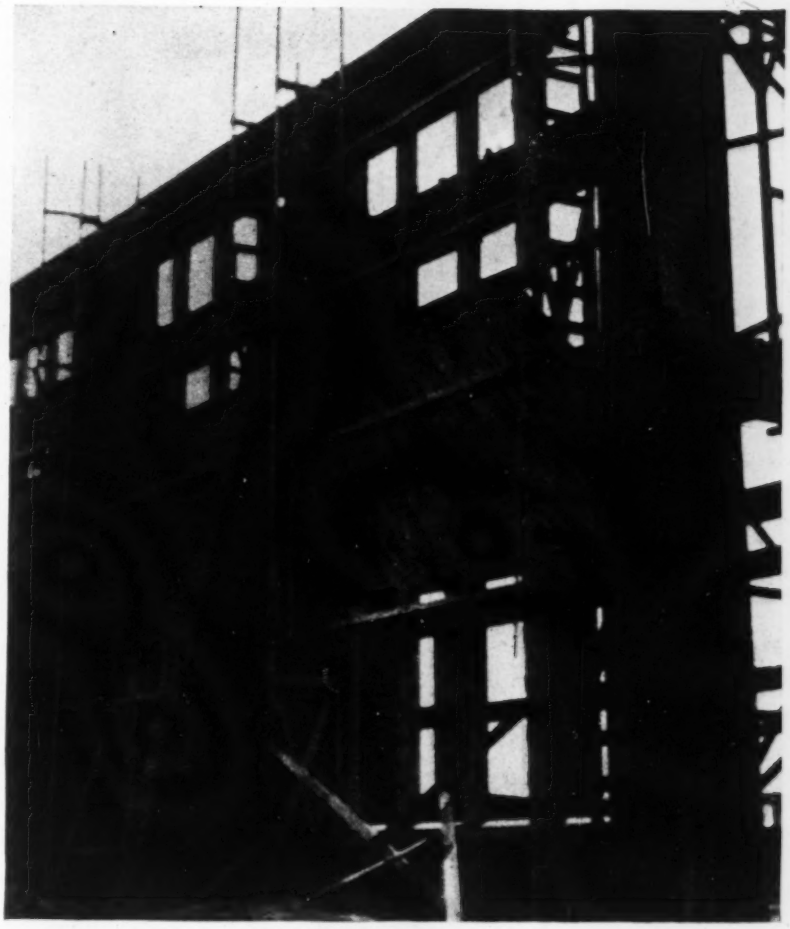


Fig. 3. Exterior wall has buttressed columns with much of wall area to be glazed. The buttressed columns extend to 36 ft. above the footings.

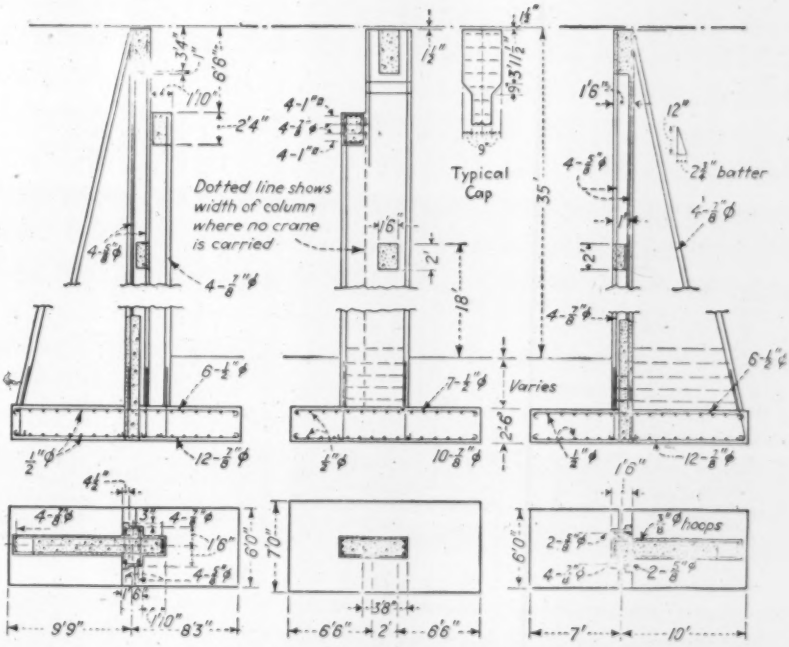


Fig. 4. Only light reinforcing is used in the concrete footings and high columns.

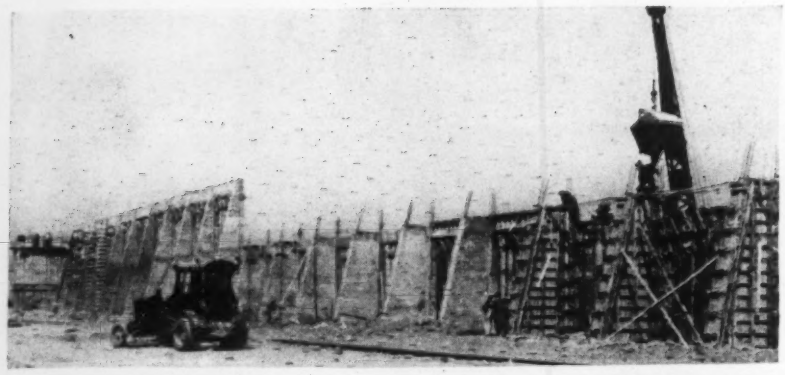


Fig. 5. Columns are placed in two lifts, first to the beam at mid-height of the span and then to the top. The column forms are used an average of four times.

hangers, to adjust the doors to prevent jamming.

Four sections of the door slide each way into pockets at the ends of the 160-ft. span. Tracks are provided for each of the four door sections but these extend only 20, 40, 60 and 80 ft., respectively, and are equipped with bumpers to stop the door at a predetermined point. Seals along the vertical edges and top and bottom of the doors are expected to prevent wind leakage and to make the huge building much easier to heat. Three pilot (small) doors are provided in the eight sliding sections at each end of the hangar.

A separate power plant provides steam for projection unit heaters suspended from the roof trusses. The heaters are 420,000-B.t.u., 9,000-cfm. units. Three units are placed in a row on each third 160-ft. long truss with an extra row of heaters at each of the doors. The heater outlets are 2 ft. above the lower chord of the trusses or 37 ft. above the floor. In the 75-ft. wide wing, 300,000 B.t.u. heaters are installed, two units being used on each third truss where there is no balcony. In the balcony section, one unit heater is used on each third truss and the offices are heated by radiators.

The hangar has an unreinforced concrete floor, 6-in. thick generally, but increased in thickness to [illegible] in. at the edges. The concrete is supplied by truck mixers and placed in 22-ft. wide lanes. Wood strips on the steel form provide a key that, with thickened edges, is depended upon to prevent the necessity for corners reinforcement and joint dowels.

Utility lines and piping are carried in shallow concrete tunnels under the floor. Frequent outlet stations are provided to make use of electric and pneumatic tools possible without cluttering the floor with loose lines. Movable, cast-in-place concrete slabs cover the 24-in. wide tunnels.

The hangar was designed by Bley & Lyman, architects, and Thos. H. McKaig, structural engineer, of Buffalo, N. Y., following truss plans developed for a similar structure by John Latenser & Sons, Inc., of Omaha, Neb. Contractors for the structure are Paugh & Brown, Inc., of Cleveland, Ohio, for whom A. R. McCreary is project manager, Albert Wendling superintendent, and Wm. Boltz, carpenter foreman.

The structure is being built for the U. S. Army Air Corps by the Corps of Engineers. Col. Geo. E. Goethals is district engineer in the district where the work is being done, Maj. Daniel Branigan is area engineer, and Capt. W. P. Miller assistant area engineer and engineer officer.

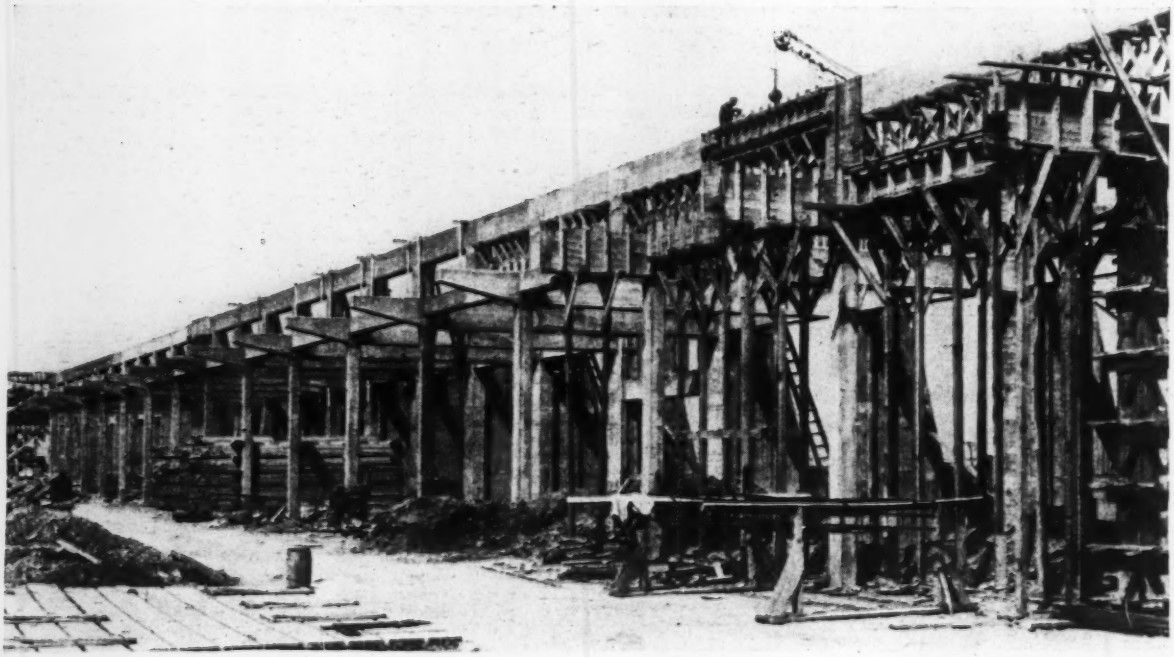


Fig. 6. Cantilever concrete beams for mezzanine. Buttressed columns, which extend 36 ft. above the footings, for support of the roof truss may be seen in the immediate background.

First-Aid for Sanitation Needs

Federal funds provided by the Lanham Act ($300,000,000) for the extension of community facilities in war-expanded areas are widely applicable to emergency sanitation needs. Much confusion and delay in handling applications has resulted from misunderstanding of the scope of the program and the manner in which it operates. A simplified explanation, in the form of questions and answers, has been prepared by the Sanitation Section of the U. S. Public Health Service. Designed primarily to aid its district office in rendering assistance for further development of the program, the questionnaire contains useful information for state and municipal authorities.

Q. What is the purpose of emergency sanitation projects?

A. To provide for sanitary disposal of human excreta and garbage and to sanitate unsafe water supplies in specific zones around war establishments, thereby reducing the intestinal disease menace to military, naval and war industrial forces in the area.

Q. Who can "sponsor" such "emergency sanitation" applications?

A. Any state or civil subdivision which has the necessary legal authority. The FWA has looked with favor generally upon *local* sponsorship by the "city" or "county" having jurisdiction where the sanitation improvement was needed. Recently, certain states and state health departments have sponsored projects subsequent to favorable opinions by the State Attorney General.

Q. What attitude does the Federal Works Agency take on the legality of using federal funds to construct privies on private property?

A. A favorable ruling has been made recently by the FWA general counsel. A portion of his recent opinion is quoted below:

"The provision of sanitary arrangements to protect persons engaged in national defense from air-borne insects or water-borne bacilli is a public project even though it be necessary to construct the facilities on property that is privately owned. The primary purpose of the project is the protection of the public health. Owners of private property may benefit thereby and the value of their property may be enhanced thereby, but that benefit or enhancement is incidental to a public purpose"

Q. How may application forms be obtained to apply for a grant to do "emergency sanitation" work around army and navy cantonments, air fields and industrial plants?

A. Application for standard forms (recently simplified) should be made directly to the state WPA administrator or the FWA regional office. The USPHS District Office or its representative must give clearance indicating the war-public health need of such projects.

Q. What types of projects call for the Construction Form of application?

A. In general, anything which calls for new construction or a considerable amount of repair work, for example:

(1) Building comfort stations where pressure water supply is available. (2) Building sanitary privies according to the "war time restrictions"—eliminating critical materials. (3) Constructing a large cistern to hold "transported water". (4) Building septic tanks. (5) Developing new dug and drilled wells or repairing existing ones.

The necessary project supervisory costs can be included in the above construction as part of the project.

Q. What type of projects may be set up on "War Public Services" application forms?

A. In general, any project involving "maintenance" and "operation" of sanitation facilities in a war area, that is:

(1) Transporting of water involving the rental of truck and labor costs. (2) Manual chlorination of transported water or of unsafe but necessary semi-public water supply. (3) Maintenance of comfort stations, both water flush and large pit type privies. (4) Garbage collection and disposal by land fill—involving labor, truck rental and supervision. (5) Typhus control project which consists mainly of labor, materials and supervision to carry on rat extermination program and vent stoppage of buildings—unless major capital or construction costs are involved which necessitate a "construction" application.

Q. What are the limitations of the Emergency Sanitation Program using Lanham Act funds?

A. (1) The work must be carried on in a specific zone—one or two mile radius from camp, factory or town where war workers live or work. (2) Critical materials must be eliminated in compliance with the agreement between the USPHS and WPB. (3) It must be essential to the war effort and the local commander of military forces should be interviewed and his intention secured as to the issuance of a "Recommendation of War Need". (4) The War or Navy Department, Maritime Commission or War Production Board in Washington must certify that the project is essential to the war effort. (5) The USPHS must certify to the public health need of the project from the standpoint of the war effort.

Q. How is this "sanitation improvement" program in war areas carried out?

A. Where construction work is to be done, such as building a cistern for storage of transported water—or building several hundred sanitary privies to clean up a specific zone around an army camp, the work is done by contract. In case it is a question of maintenance and operation of public works, for instance a garbage collection or disposal system or trans-

portation of water, a truck may be rented and labor paid by the hour or week.

Q. What relationship has the Emergency Sanitation Program to the "Community Facilities Act" by which facilities such as hospitals, schools, water and sewerage systems are being constructed with Lanham Act funds?

A. The Emergency Sanitation Program is operated under the Community Facilities Act. This program was inaugurated to provide basic sanitary facilities in areas where sewers were impracticable, or where "critical" materials were not available for the construction of water and sewerage systems.

Q. Is the scope of the FWA Emergency Sanitation Program different from that of the WPA Community Sanitation Program?

A. Yes, definitely. The Emergency Sanitation Program is restricted to *specific zones* where the local health departments and military authorities agree the "cleanup" is essential to the war effort. A strong "Recommendation of War Need" from the local commanding officer is obsolutely essential to obtain funds to make *wells safe, privies sanitary,* and *garbage disposal satisfactory.*

Q. How does the U. S. Public Health Service assist state and local health departments?

A. It will assist in securing the necessary forms and in preparing financial, legal and engineering data for the application, in getting the recommendation of the military forces, and in the technical supervision of project to its completion. This will be accomplished by the representative of the district office who is assigned to this activity. Each state should expedite this program by assigning one of the "lease-lend" or other personnel to this activity if the war area sanitation program warrants it.

Q. Is it possible to continue the WPA or private privy building program in certain states where they are productive—and also begin this "Lanham Act" emergency sanitation work in war areas of that state?

A. Yes. Several states have found that an insufficient amount of relief labor can be obtained in these war areas. Lanham Act projects are restricted to certain specific areas in and around small towns with large population increases, and the 100% grant for labor and materials is justifiable. If judgment is used, there should be no conflict in these types of sanitation programs in a State.

Q. How long does it take to obtain the necessary priorities for materials from the War Production Board?

A. The Public Health Service has established splendid working relationships with the different departments of the WPB concerned with the Emergency Sanitation Program. In all the "construction projects" approved to date, the necessary priorities have been obtained in the period 7–10 days, subsequent to the allotments, thus no real delay takes place for such a period is generally required for local advertising for bids and awarding the contracts.

Q. What is the attitude of the Public Health Service regarding approval of FWA War Public Service projects for supporting "inspection services in the local health departments," such as milk and restaurant sanitation activities?

A. The Public Health Service is of the opinion that approvals given in the review of Lanham Act "War Service" projects should be limited to provide for supervisory services necessary for the maintenance and operation of facilities and that disapprovals should be given to dockets which would seek to provide for the expansion of public health work normally provided for, through appropriations to federal, state and local health departments.

Q. What is the present status of the Emergency Sanitation Program?

A. This program was initiated in Texas where five projects are in operation. One project is in operation in North Carolina and the contract is to be awarded on October 13 for a project in West Virginia. Forty-eight applications from 22 States aggregating over one million dollars are pending approval. As of Oct. 13 approximately $150,000 has been allotted for projects of this type.

Migration of workers into war industry areas creates an emergency need for housing and expanded sanitation facilities. Trailer camps, such as the one pictured above near the site of an ordnance plant, bring special problems to municipal and state health agencies.

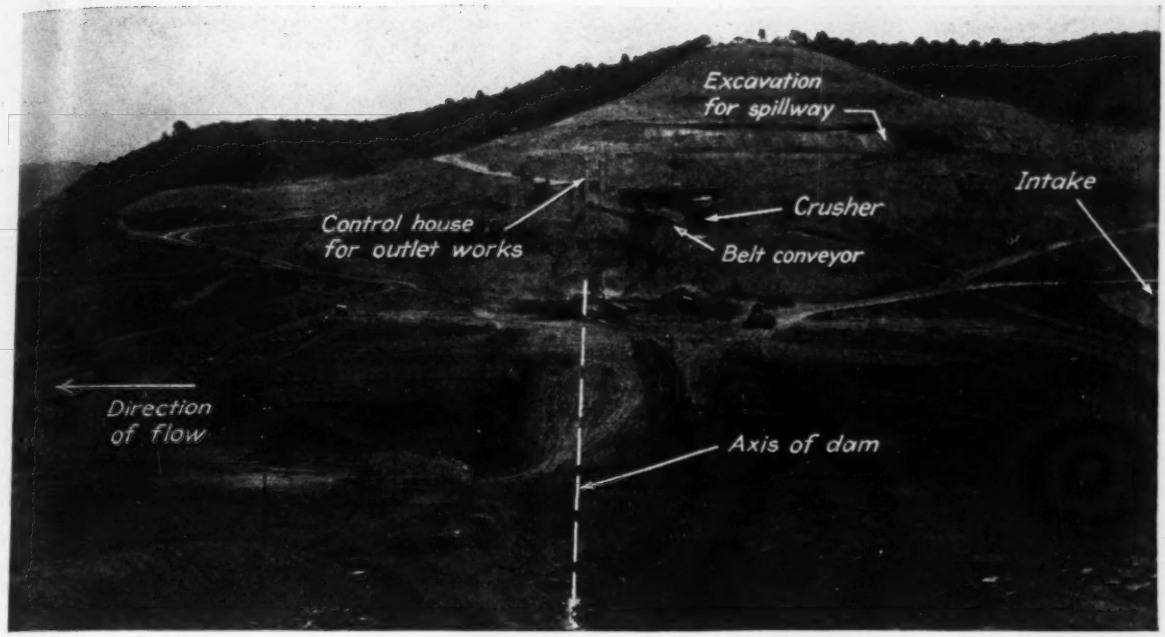


Fig. 1. Excavation for Youghiogheny Dam spillway is transported by truck to the crusher feeding the belt conveyor.

Belt Delivers Fill for Earth Dam

***Contents in Brief**—In building a 184-ft. high earth dam to aid in protecting Pittsburgh from floods, 325 ft. of belt conveyor is used to great advantage in the delivery of materials. The conveyor system transports random fill and crushed rock from the crushing plant to one end of the dam, from there, the material is distributed with carrying scrapers. Use of the conveyor results in rapid and economical construction, elimination of much truck hauling, and a better mix of the random fill. Also of special interest are the design details of the 1,800-ft. partially concrete-lined spillway.*

WHAT IS BELIEVED to be the first belt conveyor in the United States to place the fill for an earth dam directly on the structure is being used in building Youghiogheny Dam. This project is to aid in protecting Pittsburgh from floods. The belt is used for both speed and economy. At the rate of 600 cu. yd. hourly it will transport 1,500,000 cu.yd. of random fill and 79,000 cu. yd. of crushed filter rock from the crushing plant to one end of the dam. There, the material will be distributed by mobile equipment. The main conveyor is 42 in. wide and 260 ft. long and leads from the crusher, which is about half way up the high hill forming the east abutment, to a 130-ft. high tower located 50 ft. upstream from the axis of the dam. A 65-ft. distribution conveyor that swings through a 180-deg. arc with the top of the tower as the pivot point completes the system.

Site in southern Pennsylvania

The dam is being constructed across the Youghiogheny River, a tributary of the Monongahela and Ohio Rivers, 1.2 miles upstreams from the town of Confluence, Pa. The major portion of the structure is being built on a silty, clay shale but at the abutments a stratified sandstone overlying shale is encountered. The dam will be a 184-ft. high, rolled-fill structure with an impervious core faced on both the upstream and downstream sides with random and rock fills. The crest length will be 1,600 ft.

The tributary area above the dam is 435 sq.mi. To take care of flood discharges an uncontrolled, partially concrete-lined spillway, 1,800 ft. long and 350 ft. wide at the crest, is being built on the east abutment to provide a discharge capacity of 130,500 cfs. with a 22-ft. surcharge over the crest. When filled to the spillway crest, the reservoir will cover 3,520 acres, extend 17 river miles upstream, and provide a maximum storage of 247,000 acre-ft. Normal flow from the dam will be under the east abutment through a concrete-lined, 18-ft. dia. tunnel, which is now used to divert stream flow around the dam site. Major part of the storage at the dam will be used to reduce flood heights at Pittsburgh, it being expected that floods of the magnitude of the disastrous March 1936 flood will be reduced about 0.9 ft. The entire Upper Ohio flood-control system, consisting of ten reservoirs, of which Youghiogheny Dam is a part, is expected to reduce such floods by about 8.1 ft.

An accompanying drawing (Fig. 4) shows a cross section through the dam and illustrates how the impervious,

Fig. 2. Belt conveyor extends from the crusher, which is just upstream from control house of outlet works, to a 130-ft. high, steel-frame tower. The 65-ft. distribution conveyor swings through a 180-deg. arc. Legs of the tower will be imbedded in the dam as the height of the fill is increased.

random, and rock fills will be combined. Fill for the dam will total about 3,000,000 cu.yd. and will include 410,000 cu.yd. of selected impervious material, 740,000 cu.yd. of rock fill, 75,000 cu.yd. of crushed filter rock, and 1,775,000 cu.yd. of random fill, which will be made up of about 50 percent crushed rock and about one-half of overburden. The dam is unusual in that the impervious core is small in size as compared to the random fill.

Belt conveyor used for two reasons

Most of the random rock fill will be obtained from the 607,000 cu.yd. of overburden and 1,830,000 cu.yd. of rock excavation necessary for the spillway. It is in the placing of the random and filter fills that the belt conveyor will be used. The conveyor system was chosen to eliminate hauling over excessive grades and to provide for economy in distributing and placing the random fill with carrying scrapers.

Location of the crusher and belt conveyor and how they are being used in the fill operations is shown by Fig. 1. The rock and overburden from the spillway excavation, which are to be used for the random fill, are loaded by 1½ to 3½-yd. shovels and transported to the crusher by 10-yd. end-dump and bottom-dump trucks. For two reasons the overburden next is passed through the crusher. First, a long haul is eliminated; if the trucks had to travel down the hill onto the dam an extra descent of 125 ft. in elevation would be necessary for the average trip. Second, since the overburden must be combined with rock for the random fill, it is most satisfactory to mix the two materials before they are placed on the belt conveyor. To increase the moisture content to about 17 percent, the value at which maximum density is obtained, water is added to the random fill as it is loaded on the belt conveyor. This method of applying the water makes the material easier to spread than if it were left dry. In addition, less mobile equipment is necessary, since the water may be pumped to the point of application.

Maximum production from the crushing plant is about 600 cu.yd. of material hourly. This plant comprises a 100-cu.yd. bin or loading hopper, which is discharged by a special vibrating feeder onto a 6x12-ft. vibrating scalping screen with 6x6-in. openings. The minus 6-in. material, that passes through the screen is conducted by means of chutes onto the tail end of the main belt conveyor. The plus-6-in. material passes over the screen and into a 48x60-in. jaw crusher set at 6 in. when open and discharging directly onto the main conveyor. The jaw crusher is equipped with non-choking plates and has a maximum capacity of 400 tons per hour. Thus rock that is combined with overburden to make the random fill is reduced to a maximum size of 6 in.

Carrying scrapers spread fill

By swinging the 65-ft. distribution belt through the 180-deg. arc a large storage pile of random fill is stacked around the tower supporting the conveyor. For placing the random fill in its final location carrying scrapers are proving highly satisfactory. The material is placed in layers about 8-in. thick and then compacted to 6 in. with sheepsfoot rollers. This method, which results in a density of 140 lb. per cu.ft., avoids the need for continuous bulldozing to spread the material.

The small quantity of crushed filter rock required from the belt conveyor is loaded by shovel and delivered by truck.

As the dam increases in height, the legs of the tower for the belt conveyor will be embedded in the fill and left in place. Since the crusher and the loading end of the conveyor are at a point where neither excavation nor fill will be necessary, the

belt may be used to deliver practically all of the required random fill. When the dam is completed, the end of the distribution belt will clear the crest of the fill

The impervious core of the dam is being constructed simultaneously with placement of the random and rock fills. The original ground under the embankment first was stripped of all top soil and a cut-off trench was excavated to rock along the axis of the dam. Before placement of the central core was started, 2-in. dia. grout holes on 5-ft. centers were drilled to a depth of 30 to 60 ft. and neat-cement grout was added at a pressure up to 75 psi.

Impervious fill from borrow pit

Soil for the impervious fill is obtained from a large borrow pit a short distance upstream from the dam. From the pit, 410,000 cu.yd. of material, predominantly a silt containing varying quantities of sand, clay, and rock fragments, will be excavated for the impervious core. The material will be transported to the dam by carrying scrapers, supplemented by trucks where the length of haul is excessive. This fill also is spread in layers 6 to 8 in. thick and compacted with sheepsfoot rollers. Two sprinkling trucks add water to the material as it is placed to increase the moisture content to an optimum of about 17 percent. After rolling, the material has a density of about 135 lb. per cu.ft.

Placing of the fill for the dam began early this year, and as of July 1 was being placed at the rate of 16,000 cu.yd. daily. Operations are on the basis of two 10-hr. shifts, six days a week. A maximum crew of 300 men is employed by the general contractor and it is expected that the present rate of placement will be maintained for several months.

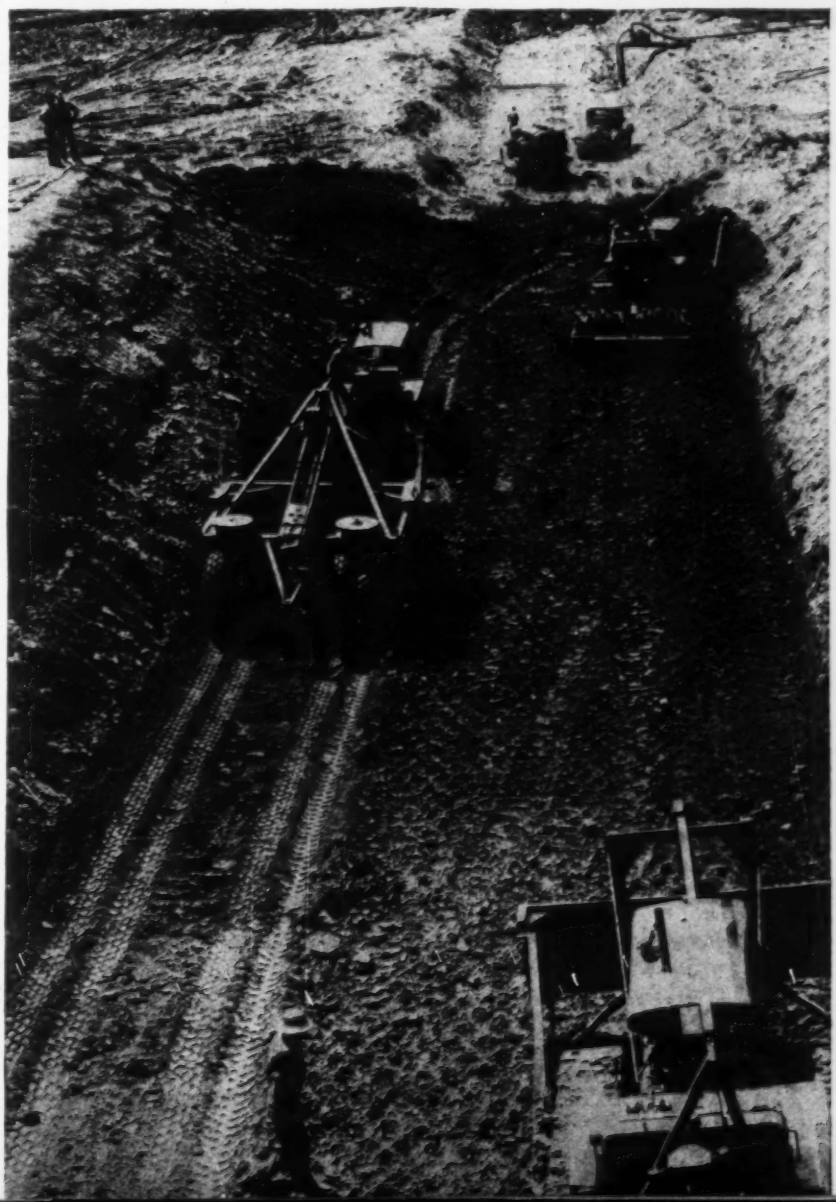
Earthwork equipment used besides the belt conveyor and the crusher includes: three 14-cu.yd. carrying scrapers; six 23-cu.yd. carrying scrapers; ten 10-yd. end-dump trucks; three 20-yd. side-dump trucks; nine 9-yd. bottom-dump trucks; four shovels of $1\frac{1}{2}$ to $3\frac{1}{2}$ cu.yd. capacity; six bulldozers; two patrol graders with 12-ft. blades; one rooter; four sheepsfoot rollers, each with three drums; five wagon drills, five paving breakers, two jackhammers, four air compressors of about 2,200-cfm. actual total capacity, and three water trucks.

Another interesting feature of the Youghiogheny project is the design of the spillway, for which concreting has not yet begun. This structure is of interest because of the provisions to relieve the pressure of water collecting behind the concrete side walls and under the bottom slab. The curved ogee crest at the entrance to the spillway is also unusual.

Maximum slope in the 1,000-ft. long spillway is 31 percent, and it is to be concrete-lined for a small portion of its length. To relieve the pressure from water collecting behind the side wills and under the bottom lining, a 48-in. dia. drainage gallery, consisting of a corrugated metal pipe perforated for half of its circumference, will be embedded in the bottom of each of the side walls (Fig. 5). Then back of these walls there is a 1-ft. minimum thickness of porous concrete made up of one part cement and 5.5 parts aggregate; the aggregate will consist of 10 percent sand and 90 percent 1-in. gravel. A similar 1-ft. layer will be placed under the bottom slab. The porous concrete will drain into the 48-in. galleries.

In addition, at all vertical construction joints in the side walls, an 8-in. dia. porous concrete drain will be built into the porous concrete backing just mentioned and these drains will discharge into the gallaries. As a further precaution against pressure building up behind the sidewalls, 2-in. horizontal drain holes are to be drilled 10 ft. into the rock

Fig. 3. Placement of the impervious fill in the cut-off trench, which was carried to bed rock and is along the axis of the dam, was by carrying scrapers. The material was spread in thin layers by bulldozers and compacted with sheepsfoot rollers.



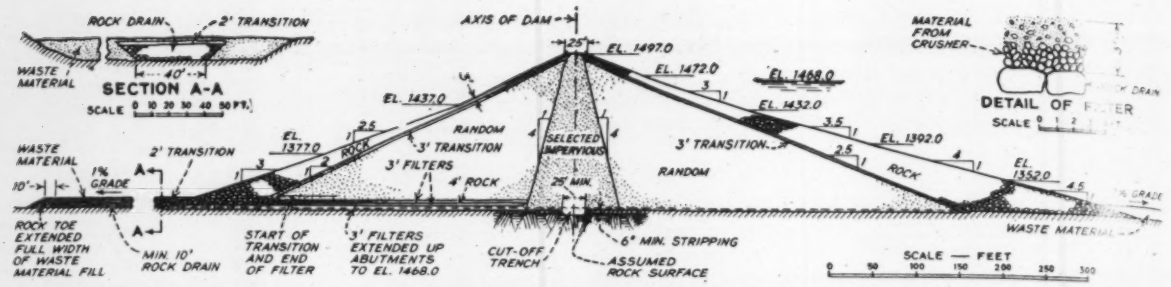


Fig. 4. Typical section through the dam. It will be noted that the proportion of impervious core to random fill is small.

at 8 to 10-ft. centers and made to drain into the porous concrete. Likewise, the vertical construction joints in the side-walls and the transverse joints in the bottom slab are designed to prevent any pressure from developing through these joints. The concrete blocks upstream from the joints are projected outward ½ in. from the front edge of the blocks immediately downstream.

This arrangement is expected to take advantage of the rush of water down the spillway to create a vacuum at the joint and thus prevent the water from finding its way under pressure behind the walls and under the bottom slab.

In most spillways of the type planned, the ogee control at the entrance is built on a straight line. However, this ogee, which is 350 ft. long with its crest two feet below "reservoir-full" level, has been curved in the horizontal plane to a radius of 870 ft. This arrangement is expected to result in a more even distribution of water down the spillway and better discharge conditions. Construction of the spillway is expected to require 17,000 cu.yd. of concrete. Concrete placing is not to start until the early spring of 1943, at which time most of the necessary 2,000,000 cu.yd. of excavation for the spillway will be completed.

The entire Youghiogheny project, which is expected to cost $9,000,000, is scheduled for completion late in 1945, but with the present rate of progress the work should be completed late next year. The work is by contract under direction of the U. S. Engineer Corps, Col. Herbert D. Vogel, District Engineer. G. P. Fleetwood is now resident engineer, and during construction of the tunnel and outlet works Chas. H. Wagner was resident engineer. Hunkin-Conkey Construction Co., with Verne Robertson, superintendent, and Al A. Mathews, engineer, is the general contractor. Herman Holmes was the contractor for the outlet works, which are now complete. Jay Cole was superintendent and George C. Newton, engineer, for the Holmes firm.

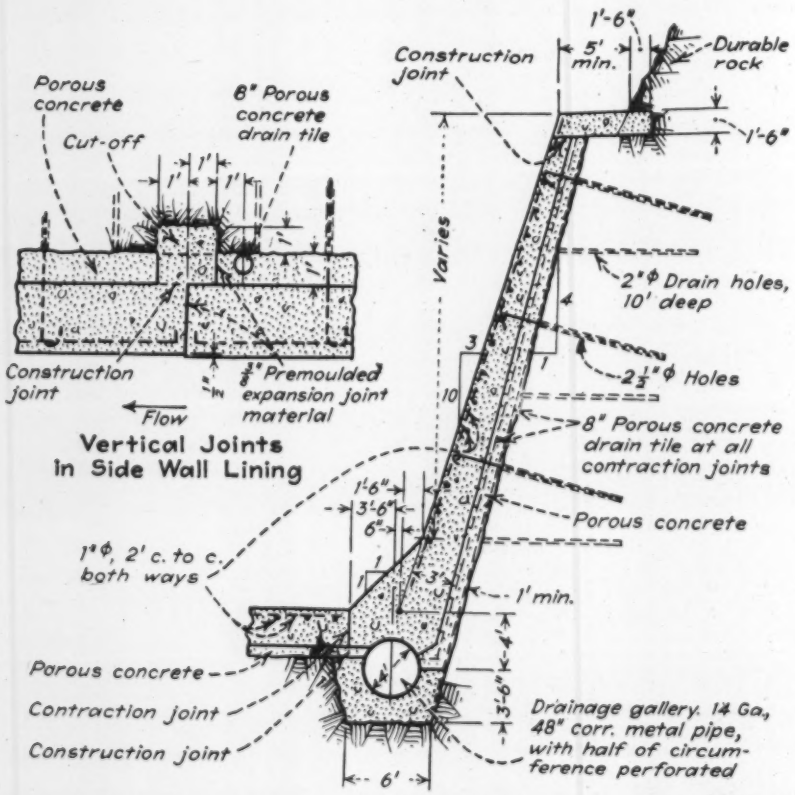


Fig. 5. In attempting to reduce to a minimum pressure from water collecting behind the concrete lining for the spillway, sidewalls of the type above are to be built.

Thames River Canalizing Revived

Canalization of the Thames River below the city of London, England, has been put forward again, but this time as a postwar project and in connection with the replanning of the city. Elimination of tidal conditions in the port is one of the main arguments that has been endorsed by a number of engineers, public officials and technical associations. The government's Ministry of Works and Planning has been urged to give further consideration to the project, although it has been opposed strongly by the Port of London Authority for a number of reasons (*ENR*, July 17, 1941, p. 111). The dam and locks probably would be 25 to 35 miles below the city, as beyond that distance the river widens rapidly into an estuary six miles wide at its mouth, some 50 miles below London Bridge.

Old roads can be kept in serviceable condition by sealing them to exclude moisture and check loss of material.

ABC's of Road Maintenance With Tars

Contents in Brief—*Scarcity of asphaltic products due to war conditions has deprived many state highway departments and city public works departments of materials commonly used in the maintenance of road surfaces. As road tars can be obtained in limited quantities to replace asphaltic products, the characteristics of such tars are given to guide those not familiar with their use. In states where tars have been used much has been done in recent years to standardize the products put out by the producers and to improve methods of use. These standards are summarized in tabular form and methods of application are outlined.*

PROBLEMS of highway and street maintenance, which are increasingly severe in all parts of the country, are particularly serious in Eastern states because the curtailed transportation of petroleum has reduced the available supplies of asphalt, and asphaltic products. At the present time an increasing amount of tar is being used for road maintenance work in this region, because it is available as a by-product of expanded steel and gas output. Many of the engineers and supervisors carrying out these maintenance operations with tar are relatively unfamiliar with the handling and application of the material. As an aid in the essential effort of keeping highways in condition to handle war traffic, and at the same time preserves as much of the road system as possible as the basis of post-war rebuilding, *Engineering News-Record* presents this brief review of fundamental data on the use of road tar for highway and street maintenance.

A standardized product

Road tar is produced from coal tar or water gas tar by suitable refining process to provide characteristics with fixed limits. Paralleling the history of other similar products, there was a long period of confusion in grading, with relatively indefinite limits for different classes of material, lack of standardization between the products of different producers and failures of highway agencies to get together on specifications.

Recently this situation has been corrected, and today tars for highway use are accurately graded and sold according to standards which have been established and adopted by the A.S.T.M. and the American Association of State Highway Officials. These grades range all the way from a liquid tar at ordinary temperatures to a material that must be applied at temperatures of between 175 to 250 deg. F.; cutbacks are also included among the standard grades. Table I indicates the official grades, their designation, and the relative consistency.

To produce satisfactory results, the various maintenance operations must be planned to take advantage of the natural characteristics of the tar. All tars tend to penetrate into the road surface and will find their way down into the road if there is any opportunity to do so. For this reason the surfaces to be treated must be as tightly closed as possible. For the same reason plant mixes should be well filled, tight gradings. Excess voids will cause trouble. To keep the tar up in the top of the road, it is recommended that the heaviest tar which will do the work be used. In almost all cases the hot tars (RT-7 and above) should be used for the final seal coat.

When a small amount of new material should be added to the surface, uniformity and cover can be obtained by the use of a mechanical spreader.

TABLE I—GRADES OF TAR USED FOR HIGHWAY CONSTRUCTION AND MAINTENANCE

Approved Grades	Consistency		Application Temperature Deg. F.
RT-1	Specific viscosity, Engler, at 40° C.	5–8	60–125
RT-2	Specific viscosity, Engler, at 40° C.	8–13	60–125
RT-3	Specific viscosity, Engler, at 40° C.	13–22	80–150
RT-4	Specific viscosity, Engler, at 40° C.	22–35	80–150
RT-5	Specific viscosity, Engler, at 50° C.	17–26	80–150
RT-6	Specific viscosity, Engler, at 50° C	26–40	80–150
RT-7	Float test at 32° C., seconds	50–80	150–225
RT-8	Float test at 32° C., seconds	80–120	150–225
RT-9	Float test at 32° C., seconds	120–200	150–225
RT-10	Float test at 50° C., seconds	75–100	175–250
RT-11	Float test at 50° C., seconds	100–150	175–250
RT-12	Float test at 50° C., seconds	150–220	175–250
RTCB-5	Specific viscosity, Engler, at 50° C.	17–26	60–120
RTCB-6	Specific viscosity, Engler, at 50° C.	26–40	60–120

Recommended Grades for Maintenance Work

Grade	RT 1	2	3	4	5	6	7	8	9	10	11	12	CB 5	CB 6
Dust layer	x	–	–	–	–	–	–	–	–	–	–	–	–	–
Prime coat	–	x	x	x	–	–	–	–	–	–	–	–	–	–
Surface treatment	–	–	x	x	x	x	–	–	–	–	–	–	x	x
Drag leveling course	–	–	–	–	–	x	x	x	–	–	–	–	–	–
Seal coat	–	–	–	–	–	x	x	x	x	x	x	–	–	–
Soil stabilization	–	x	x	x	x	x	–	–	–	–	–	–	–	–
Road mix														
Coarse aggregate	–	–	–	–	–	x	x	x	x	–	–	–	x	x
Dense aggregate	–	–	–	–	x	x	x	x	–	–	–	–	–	–
Penetration macadam	–	–	–	–	–	–	–	–	–	–	x	x	–	–
Cold pre-mix	–	–	–	–	–	–	x	x	x	x	–	–	–	–
Hot pre-mix	–	–	–	–	–	–	–	–	–	–	x	x	–	–
Cold patch	–	–	–	–	–	–	–	–	–	–	–	–	x	x
Hot patch	–	–	–	–	–	–	–	–	–	x	x	x	–	–
Crack filler	–	–	–	–	–	–	–	–	–	–	x	x	–	–

The aggregate used for cover material on surface treatments should be relatively small in size and should be well graded. The use of one sized large aggregate is apt to result in work which will not be satisfactory. The covering aggregate should be uniformly distributed over the road surface. Uneven application will cause a bad appearing and rough riding road. An excess of cover should not be used since it wastes material and the abrasive action of the extra loose aggregate wears away the tar surface.

For removing irregularities in the surface, a drag leveling course should be used. Here, the combination of tar and aggregate may be dragged with a sled or long base drag. However, this should be followed by a seal coat which is not disturbed except to distribute the cover evenly with brooms. When the depth and gradation of the drag course indicate that it is necessary, the drag course should be choked with a fine aggregate, well rolled, in order to hold the seal material on top.

Rolling will assist in embedding the aggregate into the tar seal coat although care should be taken not to crush the aggregate particles. Under certain conditions it is advisable to close the road for at least 48 hours to prevent loss of cover.

Tar may be applied when the road is damp, but not when it is wet. Wet aggregate should not be used for covering material.

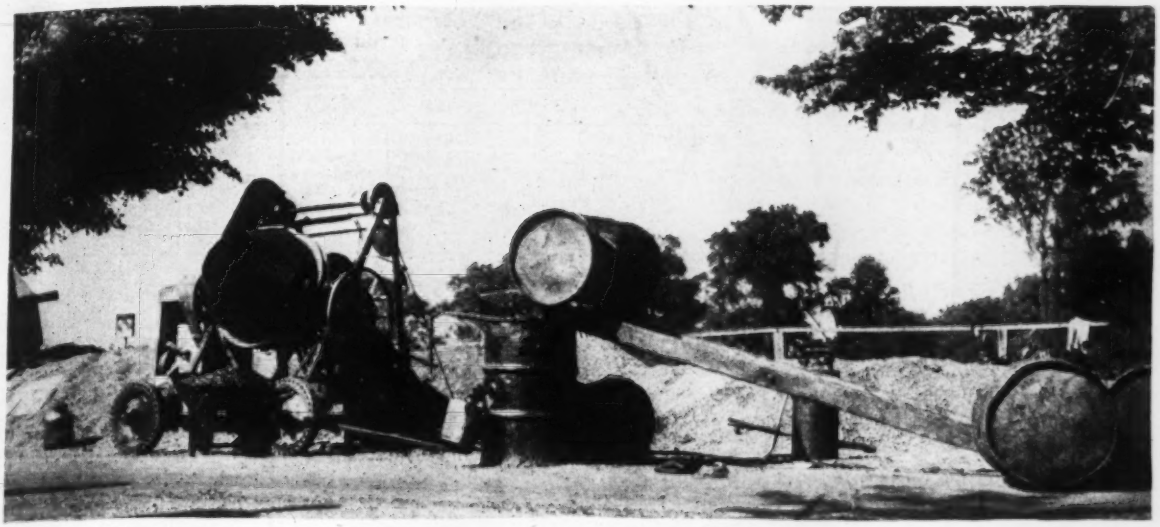
The temperature of application is very important with tars and the maximum values given in the tables must not be exceeded. Apply the tar at the lowest temperature, within the given limits, that assures proper and uniform distribution.

Cold and hot patching

Cold patching usually combines RTCB5 or 6 grade of tar with an aggregate grading from $\frac{3}{4}$ in. to No. 8 (see Table II). Grade RT-6 may be used late in the fall. Grades RT-7 and RT-8 must be heated before mixing with the aggregate.

The use of trap rock or other hard stone makes it advisable to add from 10 to 20 percent of fine aggregate to aid in filling the voids.

The proportioning of tar to aggregate cannot follow a strict rule because of variation in grading and the amount of tar which may be absorbed by soft material. In general,



Where a considerable amount of cold patching materials is required, a concrete mixer can be used to advantage. The drum should not be charged to more than 75 per cent of its capacity. Stockpiling the material improves its wearing properties.

the tar must be sufficient to coat all of the aggregate without providing an excess which will run when the mixture is placed in stockpiles. From 14 to 16 gallons of the cutback per cubic yard of aggregate would be a general rule, although an increase to from 18 to 20 gallons may be required by an aggregate with high absorption factors such as slag. Generally, too little is better than too much because any deficiency can be made up in the application of the seal coat.

The aggregate and tar can be mixed either by hand on a mixing board or in an ordinary concrete mixer. The aggregate should be clean and dry, and in cold weather may be heated, although not above 100 deg. F.

Hand Mixing

For hand mixing, the tar should be added in one or more applications, followed by several turnings, after which the fine aggregate, if used, may be added and turning resumed until the material is thoroughly coated. In the use of a mechanical mixer, it should not be loaded to more than about 75 percent of its rated capacity. The mixing should continue until the aggregate is uniformly coated.

Although this mixture may be used immediately for patching, the product will become tougher and assumes longer-wearing characteristics if it is cured for several days in a stockpile. Storage can be continued for some months without material change in the properties of this patching material.

Application should follow the cleaning of the hole, which should be painted with a light coat of the cold patch material to provide a bond and to seal the joint around the patch. The patch material should then be added to bring the surface slightly above that of the adjoining material. After consolidation by tamping or rolling, such patches should be seal-coated unless the entire section of highway is to be surface-treated within a reasonable period. However, if the patch is an open mix and the pavement surface is dense, it generally will be found advantageous to seal the patch in order to produce a surface texture similar to that of the pavement treated. After the patch has been exposed to traffic for several weeks it should be cleaned, followed by the application of a light seal coat of the cold-patch material, and,

Skill in handling binder materials is essential in these days. Well trained men know how to get enough hot tar on the stone with little or no waste.

TABLE II—COARSE AGGREGATE SIZES

Size No.	Nominal size, square openings	Amounts finer than each laboratory sieve (square openings) percent by weight									
		2½ in.	2 in.	1½ in.	1 in.	¾ in.	½ in.	⅜ in.	No. 4	No. 8	No. 16
A	2" to 1"	100	90 to 100	35 to 70	0 to 15	.....	0 to 5				
B	1" to ¾"	.....	.....	100	90 to 100	40 to 75	15 to 35	0 to 15	0 to 5		
C	¾" to No. 8	.....	.....	.....	100	90 to 100	.....	30 to 65	5 to 25	0 to 5	
D	½" to No. 8	.....	.....	.....	.....	100	90 to 100	40 to 75	5 to 25	0 to 5	
E	⅜" to No. 8	.....	.....	.....	.....	.....	100	85 to 100	10 to 30	0 to 10	
F	No. 4 to No. 16	.....	.....	.....	.....	.....	.....	100	85 to 100	10 to 40	0 to 10

finally, covered with stone chips, pea gravel or coarse sand.

For hot patching, grades RT-10-11-12 are commonly used. These tars should have an application temperature of from 175 to 250 deg. F. When the hole to be patched is more than 2 in. deep it should be filled with 2-in. broken stone tamped and with the voids filled with sand or screenings. This filling should come to within 2 in. of the surface. The wearing portion of this type of patch consists of 1½ in. broken stone tamped or lightly rolled. The tar should then be applied at the rate of one-half gallon per square yard per inch depth of stone, using an application temperature of about 250 deg. F. The final course of ½ in. stone or chips should be used to fill the surface voids, followed by tamping or rolling. The final seal coat should be an application of ½ gal. per sq. yd. of the tar, covered with stone chips, followed by final tamping.

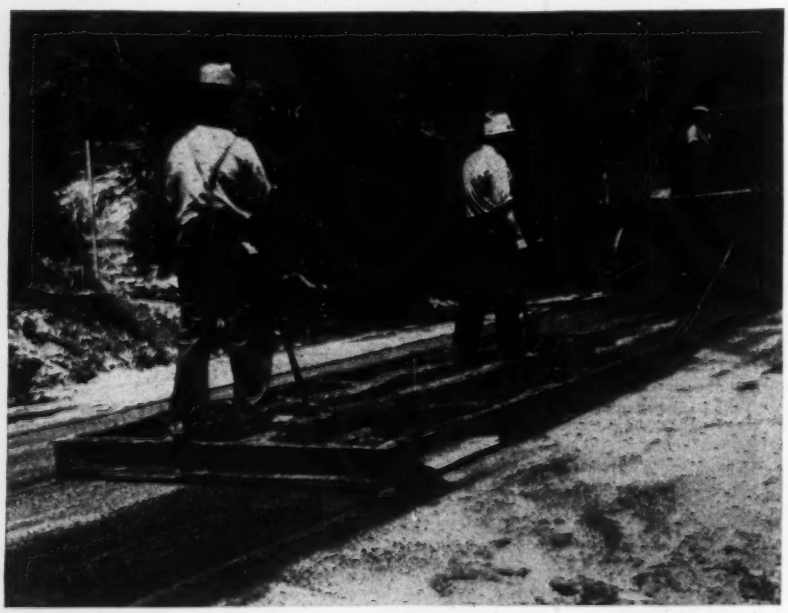
TREATMENT OF VARIOUS TYPES OF SURFACES

If the maintenance program can be extended to include the rural type of gravel road having a clay content not exceeding 20 percent of the gravel, it is possible to provide a simple tar treatment which will accomplish the double purpose of (1) reducing the dust nuisance and (2) conserving the gravel surfacing. Assuming that the gravel road has a tight surface hard enough to be swept, sweeping is the first step in the program. Application of a tar prime coat (RT-2, RT-3 or RT-4) then should be followed by a second application of hot tar (RT-8 to RT-10).

Roads treated with this procedure may require frequent care due to surface breaks caused by lack of uniformity in the gravel. Patching of small holes can be done with RT-6 or cold patch, either directly or from material mixed and stored along the road for this purpose. If the road requires little patching it may be economical to re-treat the second year using about one-third of a gallon per square yard (RT-7 to RT-10) with a pea gravel or chip covering.

If the surfacing consists of crusher-run stone, in place of gravel, the treatment is practically the same. When the material is slag, the application must be increased approximately 25 percent. If this surfacing is not strong enough to support the traffic, a solution includes scarifying and stabilizing with tar as a base course for a subsequent surface treatment.

It should be emphasized here, however, that only those gravel, macadam or stone roads that are of sufficient strength to support the traffic should be treated. Roads without such strength will break up during the winter, whereas if only satisfactory bases are selected for surface treatment, the number of surface breaks will be negligible and roads can be maintained with little patching.



Irregularities in the old surface often can be eliminated by the use of a drag to distribute new material and fill up the low spots.

Macadam maintenance

Macadam road maintenance is generally similar to that for gravel or crusher-run material. The first step consists of making necessary repairs and filling holes, followed by a thorough sweeping, which is important. Under some conditions a rough surface can be improved by scarifying, but under other conditions harm may be done by disturbing the solid base. If conditions indicate that no harm will be done by scarifying, a cheaper and better job can be obtained by that treatment before applying a bituminous surface. Where it appears safer not to disturb the base, rough surfaces can be corrected by drag treatment or by adding a mixed-in-place top.

Mechanical cleaning of the surface before application of the prime coat has been used in Kentucky, employing a blower mounted on a truck to remove the dust.

After scarifying, the road must be compacted again with a heavy roller until it returns to its original compaction. The best treatment includes the application of a prime coat followed by a hot seal coat, as already described.

In many cases a highway will remain in usable condition for two or three years after this treatment, depending upon the traffic and the depth of surfacing. Normal re-treatment would consist of another seal coat at a rate of about ¼ gal. per sq.yd. with 20 lb. of cover per sq.yd.

Maintenance of bituminous surfaces, unless there has been severe neglect, usually only requires the application of a seal coat for waterproofing and to replace material lost in traffic. Such a maintenance program on a bituminous surface would involve (1) the patching of holes and breaks, (2) sweeping of the surface to remove loose material, (3) application of the seal coat at the rate of 0.2 to 0.35 gal. per sq.yd. and (4) adding 15 to 30 lb. of cover per sq.yd. followed by broom dragging and rolling, if possible, to embed this material into the tar.

Due to the shortage of bituminous materials, it is important to see that they are used to best advantage. To do this, careful study should be made of any existing surface before deciding on whether or not it requires a surface treatment and to determine just what type of treatment is most suitable. The selection of the treatment should be determined by the condition of the road surface. For example, a tight surface might only require a light seal coat, whereas an open or porous surface would require a heavier treatment. In addition, the amount of traffic using the road and the type of locally available cover material should play a part in determining the proper grades and quantities of both tar and aggregate that should be used.

Tars can be used successfully in the reconstruction and maintenance of all kinds of pavements. Seal coats are most commonly used to renew the surface and correct minor irregularities. The drag leveling course will correct uneven riding qualities, and also add to the strength of the highway. Tar mixes, road or plant, hot or cold, are used to resurface and strengthen existing pavements.

TABLE III—RECOMMENDED AGGREGATE SIZES FOR MAINTENANCE WORK

Uses	Size Number (See Aggregate Size Table) A	B	C	D	E	F
Seal coat	–	–	–	–	x	x
Surface treatment	–	–	x	x	x	x
Drag leveling course						
Mix	–	–	–	x	–	–
Seal	–	–	–	–	–	x
Road-mix — Coarse aggregate						
Mix	–	x	–	–	–	–
Choke	–	–	–	–	x	x
Seal	–	–	–	–	x	x
Penetration macadam — Coarse aggregate	x	–	–	–	–	–
Choke	–	–	–	x	x	–
Seal	–	–	–	–	x	–
Cold patch	–	–	x	–	–	–

In the preparation of this article the editors had the advice and assistance of engineers of the Tar and Chemical Division of Koppers Company, of the Barrett Division of the Allied Chemical & Dye Corp., and of the Ohio Division of Highways. Photographs were supplied by the two producers of road tars.

Bead Reflectors Replace Flicker Traffic Signs

Chicago is changing its 7,000 "stop" and "slow" traffic warning signals from battery-lighted flicker signs to glass-beaded reflectors, finding them more economical and just as safe, according to information from the American Public Works Association.

The reflector signals, costing an average of $3.08 each, were chosen after several months experimentation to find a satisfactory substitute for the flicker lights, which included materials on war-priority lists, and were powered by current from storage batteries in the bases of the signs.

Four-fifths of the signs have been changed thus far, saving the city approximately $200,000 a year in maintenance costs. Warning arrows on street car safety islands, also formerly flicker lighted, are being changed to reflectors.

Establishing Grades on Airfields

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State University of Iowa, Iowa City

***Contents in Brief**—A method for preparing an isometric grade chart is proposed for use in selecting grade for an airfield. Computations are reduced to a minimum and adjustments to save excavation can be made largely on the basis of visible inspection of the chart. Field methods for laying out runway intersections by the same system are given.*

MOST ENGINEERS have at one time or another set grade stakes. On railroad and highway location work it is customary to run a transit line, on which stakes may be driven and levels taken at 100-ft. intervals. In certain locations, ground elevations are then taken each side of this transit line for a distance that is dependent on the nature of the topography. These elevations are plotted on paper, contours drawn, several trial locations are laid down and then profiles of these are made. Trial grade lines are then placed on the profiles, cuts and fills more or less balanced, until finally a suitable layout is found that promises to be satisfactory.

In this type of survey only one line, the center line of the railroad or highway, is generally used in plotting the profile and in making the cut and fill estimates. Later, when the slope stakes have been set and the actual volumes of cut and fill have been computed, there may need to be a slight readjustment of the grade in order to more nearly balance these volumes.

In determining the grade of an airfield a different approach is essential if unnecessary and possibly costly grading is to be avoided. When it is appreciated that grading costs run

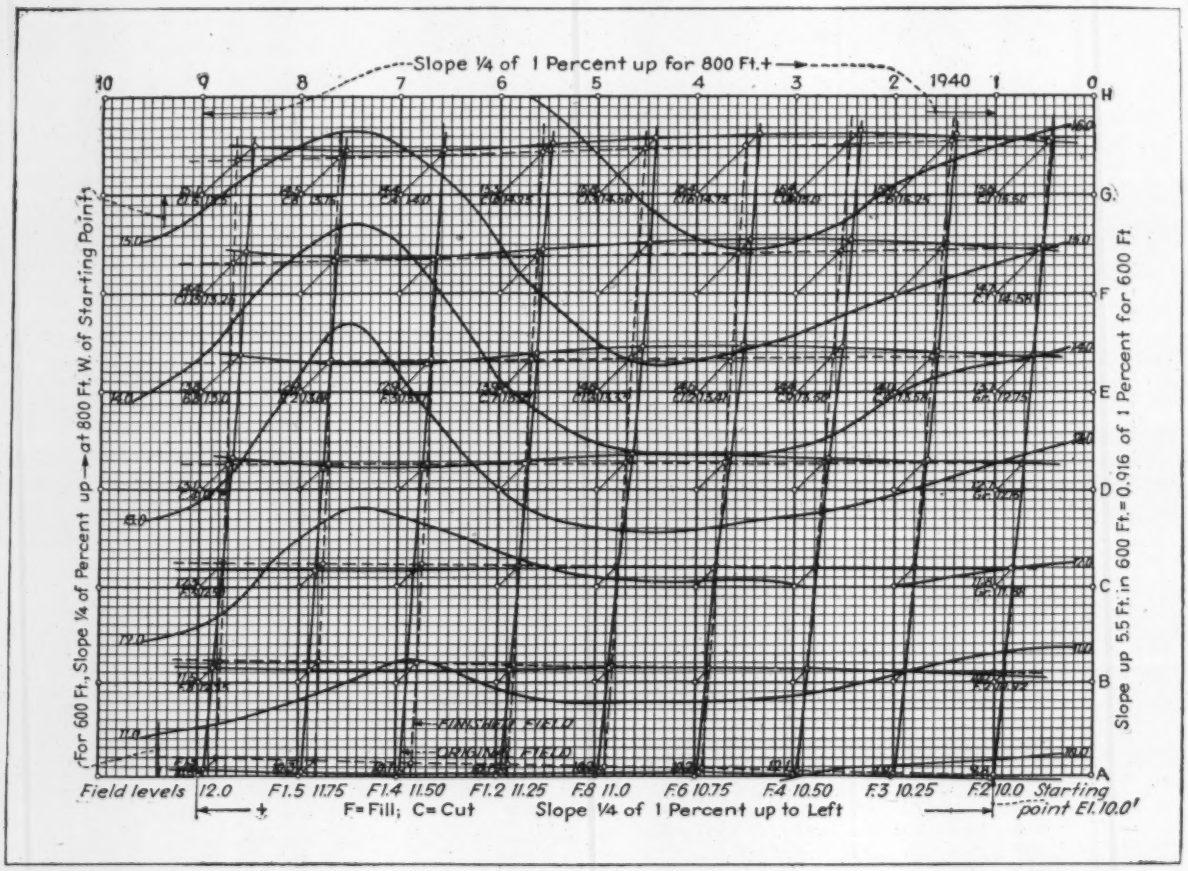

Fig. 1. Isometric grade chart developed for a section of an airfield. By selecting a datum plane slightly below the level of the low point in the area under consideration and plotting the elevations of grid points at a 45-deg. angle from these points the field surface is made to appear as an undulating surface above the datum plane. Finished grades are shown as dash lines in this drawing.

from a few cents to upwards of a dollar per cubic yard, and that one foot depth of dirt covering a square mile approximates one million cubic yards, one will realize the necessity of properly laying out the gradients of an airport so that the job can be done economically and efficiently. It will also be appreciated that a proper survey costing only a few hundreds, or perhaps thousands, of dollars may eventually save a great many thousands, or even hundreds of thousands, of dollars in later development.

If a preliminary survey has been made, the field may be contoured at one-foot intervals to facilitate preparation of preliminary plans for the general layout of the field and its drainage. Once a decision on these matters has been reached, the field should be laid off in a square grid, and stakes set at, say 100-ft. intervals in each primary direction. It is preferable that the grid be made in a square pattern, but conditions might suggest the use of a square slightly distorted, a diamond pattern. On these grid lines at the sides of the field should be placed reference stakes, so situated as to be usable through the life of the grading job. It would be well to use a controlled system of stake identification; for example, the lines running easterly and westerly to be designated by the letters A, B, C, D, etc., and repeat if necessary with subscript, 1: the northerly and southerly lines to be designated with numerals 1, 2, 3, 4, etc.

Let us now assume that the stakes are set at the 100-ft. grid points and that the identifying numbers, as for example, C-6, have been written on them with an indelible red pencil. Ground elevations at each stake are now taken and properly recorded in the field book. Any datum plane desired may be used, but in some ways the use of a datum, say slightly below the lowest part of the field, will minimize the size of the numbers involved.

Isometric profile constructed

At this point I wish to introduce a rather novel method of showing two profile systems at right angles to each other on the same diagram. In Fig. 1 a small section of the field about 600x800 ft. is shown. It was laid out on coordinate ruled paper, 10-10 to the inch. Each inch represents 100 ft. north and south, and east and west. Elevations of the ground level are written in the upper left quadrant at each grid point. In this case the lowest elevation was 9.8 ft., and the highest 16.5 ft., a difference of about 7 ft. over this fractional area of the field. For diagrammatic purposes the datum plane was raised 10 ft., thus reducing each elevation by that amount.

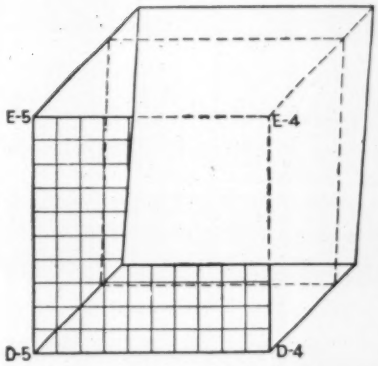

Fig. 2. To demonstrate the isometric effect, the block above the square bounded by points D-4, D-5, E-5 and E-4 has been lifted out of Fig. 1. The level of the finished grade is shown by dash lines.

A modified isometric profile drawing is now produced as follows: Lay off at each grid point the elevation of that point in both horizontals and vertical projection and extend lines vertically and horizontally from these points to meet a 45-deg. inclined line drawn through the grid point. For example, assume the reduced elevation is 4.4 ft. as at E-3, Fig. 1, simply choose a point on the 45-deg. diagonal line 4.4 ft. above the horizontal grid line. It will also be 4.4 ft. to the right side of the vertical grid line. After laying off all of the elevations in this manner, connect these points on the diagonals by lines running easterly and westerly, and northerly and southerly. You will now have approximate profiles in both directions based on all of the 100-ft. grid lines. The actual error will be too small to be of significance.

Observe now, as you look down at the sheet, that you can visualize the three dimensions, the area of the section of the field together with its depth (Fig. 2). In this case the horizontal scale is 10 times as large as the vertical, but final results are not affected as actual figures are used in the computations.

The next problem is to establish the level of the finished field in such a way that desirable grades may be used over the area involved, and with a minimum of earth removal. In case of two dimensional layouts on the ordinary highway or railroad profile this is comparatively simple, but with this three dimensional problem a little more juggling is required. In two dimensional work, use of a thread sometimes is helpful in establishing the grade line and in balancing cuts and fills on the profile. A thread and a few pins also are useful in this three dimensional problem in order to properly balance the cuts and fills, and in choosing the best grades for the field.

In general, for airfields, always try to keep away from absolutely level grades; and also, if possible, stay well within the maximum allowed. At the present time the Civil Aeronautics Authority is setting a limit of about 1 percent, although as high as 2 percent may have been allowed in some cases in the past.

The finished surface

It will be well now to visualize the profiles of the *finished* surface of the field as superimposed both above and below the *original* ground level profiles shown on this isometric plan. In general the finished field will consist of a number of slightly inclined planar surfaces meeting at their edges, and properly rounded off with vertical curves so that there need be no rapid change in the gradient. These surfaces are generally warped, as will later be shown.

In the problem shown in Fig. 1, it seemed desirable to slope the field up towards the west and north, as the contours indicated this choice. However, the adjacent sections of the field should be considered before a final set of grades is established on any particular section. A grade of ¼ of 1 percent or 0.25 ft. in a 100-ft. grid, was selected for a trial, and a start was made at the low point in the area, at A-1, and at an elevation 10 ft. above the original datum. Running westerly 800 ft. to point A-9, the finished field grade (F.F.G.) here would then be at an elevation 8x0.25 = 2.0 ft. above the starting point at A-1. Stick a pin on the 45-deg. diagonal line horizontally opposite a point 2 ft. above A-9, and stretch a fine thread between this pin and the one at A-1. Observe now the isometric profiles from A-1 to A-9 of both the original field and the proposed finished field. Over all of this distance

a fill (F) is shown, varying from 0.2 ft. at A-1 to 1.5 ft. at A-9.

Again start at the pin on the diagonal at A-9, and run the thread to the north, observing how the cuts and fills vary as the thread at G-9 is moved to the right or left. A choice is made about 3.5 ft. to the right of G-9, a pin is stuck on the diagonal at this point, and the thread is tied here. The gradient of this slope from A to G on line No. 9 is now found to be 3.5 ft. — 2.0 ft. divided by 6 = 0.25 ft. per station, or a 0.25 percent grade up to north. Starting again at the pin on the diagonal at G-9, and observing the thread as stretched from here to a pin on the diagonal at G-1, it is found that an elevation of about 5.5 ft. at this latter point gives a profile which showed cuts only throughout this distance from G-1 to G-9. The thread is now stretched from the pin on the diagonal at G-1 at elevation 5.5 ft. down south to the point of beginning at A-1. This gradient of 5.5 ft. in six stations is 0.92 ft. per station or 0.92 percent.

With the thread now stretched around the entire section and indicating profiles between the original ground surface and the F.F.G. on these exterior grid lines, it is easy to make a further examination. Take another thread and stretch it either north or south, or east and west on corresponding points on any main grid where the diagonals and the outside, or circumscribing, thread intersect; as for example, a thread from the point on the diagonal at E-1, where the outside north-south thread from G-1 to A-1 intersects it, to a point at E-9 on the diagonal where the north-south thread from G-9 to A-9 intersects it. This thread shows the cuts and fills at all points on the E system. And similarly for all other grids whether they be north and south or east and west.

In this way, and after a few trials, gradients can be established that will visually show a well balanced system of cuts and fills over the whole area.

It is seen that the finished field grades are computed directly, as the slopes are constant along the main grid lines, first, along the outside boundaries A-1 to A-9, A-9 to G-9, G-9 to G-1, and G-1 to A-1; second, along all interior grid lines north and south, and east and west. For example: at A-1, the F.F.G. elevation = 0.0 ft.; at any other point to the west add 0.25 ft. per station. A-2 = 0.25; A-3 = 0.50; . . . A-9 = 2.00 ft. At A-9 F.F.G. elevation = 2.0 ft.; at any point to the north add 0.25 feet per station. B-9 = 2.25; C-9 = 2.50; . . . G-9 = 3.50 ft. Similarly along the north line from G-9 to A-9, and along the eastern line from G-1 to A-1.

Then a line from, say, G-5 to A-5, has a constant slope, and the elevations are readily interpolated. Similarly for all the main grid lines north and south, and east and west elevations are computed directly and set down in the lower right quadrant at each grid point. The cut or fill at each station is shown in the lower left quadrant.

It will be noted now that each one of all of the parallel lines running east and west or north and south has a constant slope throughout the entire section being considered, but that no two have the same slope. This causes all slopes in diagonal directions to be slightly warped.

STAKING RUNWAY INTERSECTIONS

In connection with the use of an isometric grade chart in laying out airport field grades, it should be noticed that this can also be used to excellent advantage in designing and laying out runway intersections.

Assume that the finished field grades have been set, and the runways determined from a study of the prevailing winds, the size of the field, and its surroundings. Plot the field and its double set of isometric profiles around the area involved in the intersection as shown on Fig. 3. Orient the runway layout on this chart, showing the intersection to the same scale as the field. The whole of the intersection should now follow the finished field grades over this same area. The runways for some distance, say 200 ft. or more from the outer limits of the intersection, should also hold to the F.F.G.s, allowing the surface drainage over the runways to flow across in one direction only. Intercepting storm water intakes may be placed on both upper and lower areas, on either the field proper or on the runways as may seem to fit the situation to best advantage.

Where the field has a definite slope sufficient to provide transverse drainage of the runways, there seems to be no advantage in trying to install a center crown and side gutters on the runaways.

For practically all air fields there is a decided advantage in having all runways and intersections follow the finished field grades. By doing this there will never be any difficulty in adding additional runways. As an example of the disadvantage of the use of crowned and guttered runways, I can cite an airport on which a crowned and guttered concrete runway 150 ft. wide was built. When this east and west runway was installed only last year, the flattened out intersection for a proposed north and south runway was constructed at a certain location. When the north and south runway was finally laid out this past summer, it was located several hundred feet west of its first location. On account of the crown and gutters at this point, it was necessary to rip out a strip of several thousand square yards of heavy concrete paving, haul it away, and then build several thousand square yards to replace it. It naturally follows that all intersecting runways built in the future on this airport will have the same trouble.

To lay out an intersection using the isometric chart, the problem then consists in drawing the runway intersection to the same scale as the chart, then orienting and superimposing it in its proper location. The intersection in its entirety will then be staked out to the F.F.G.s at all points. It will usually be a slightly warped surface on which there is adequate drainage, and with no water pockets at any point.

Stakes for the contractor

Inasmuch as each of the main grid lines in both major directions has a constant slope of its own, yet different from its neighboring parallel line on either side, the following method suggests itself from a paving contractor's standpoint. Let the engineer set F.F.G. stakes at, say G-2, G-8, C-2, and C-8. It may be desirable, and it will certainly be a great checking help to the contractor if all the main grid point F.F.G.s are set by the engineer, but it is not necessary. For example, suppose a few or

all of the stakes except those above mentioned have been removed or are under suspicion. The grade setting party should consist of about four men equipped with three sticks of equal length, say 5 ft. long, a 100-ft. steel tape, necessary grade stakes, and a maul. It should start at G-2, and go west. One man stands at G-2 and directs the other two men with the chain until the head chainman is on line with G-8. At 100-ft. a pin is set and a grade stake started and driven until the top is at such a level that the tops of the three sticks—one held at G-2 on F.F.G., one held at G-8 on F.F.G., and the one at G-3 on the stake being driven—are on a direct line and slope as evidenced by the men at G-2 and G-8 sighting over the tops of the stakes. Continue this at G-4, G-5, G-6, and G-7. Then run the other three sides of the rectangular in the same way; that is G-8 to C-8, then C-8 to C-2, and then C-2 to G-2.

This gives an area 400 by 600 ft. surrounded by F.F.G. stakes at 100-ft. intervals. On account of the varying grades on each side of this rectangle, the area involved will have a warped surface. If now the internal grade points should require setting, all that is necessary is to perform on any of these major grid lines in precisely the same way as was done for the outside lines. Suppose the D, E, and F stakes on lines 3 to 7 inclusive have thus been set by this direct slope method, it will now be found that the tops of the stakes in the opposite direction grid lines are also on a constant slope. These slopes are indicated on the figure by the straight lines drawn through the F.F.G. points, as indicated by the numbers at the grid points.

It will now be observed that the edges of the runways may or may not be in line with the grid layout. All the steps that are necessary to set intermediate grade points after the actual ground location of the runways has been established and staked out, now become evident. Since all grades on the major grid lines are of constant slope in either direction, so will also be the grade points, on, say, the 10-ft. lines or any lines, parallel to them. For example, suppose a grade is wanted at a point 50 ft. north and 55 ft. west of D-3. First set small stakes to grade 50 ft. north of both D-3 and D-4 by the sighting in method previously used. Then from these stakes sight in the grade stake 55 ft. west of the first of these points.

For small areas, taut strings stretched between the tops of established grade stakes can be used to set intermediate stakes. The thing to remember is that the strings must be kept parallel to the main grid lines.

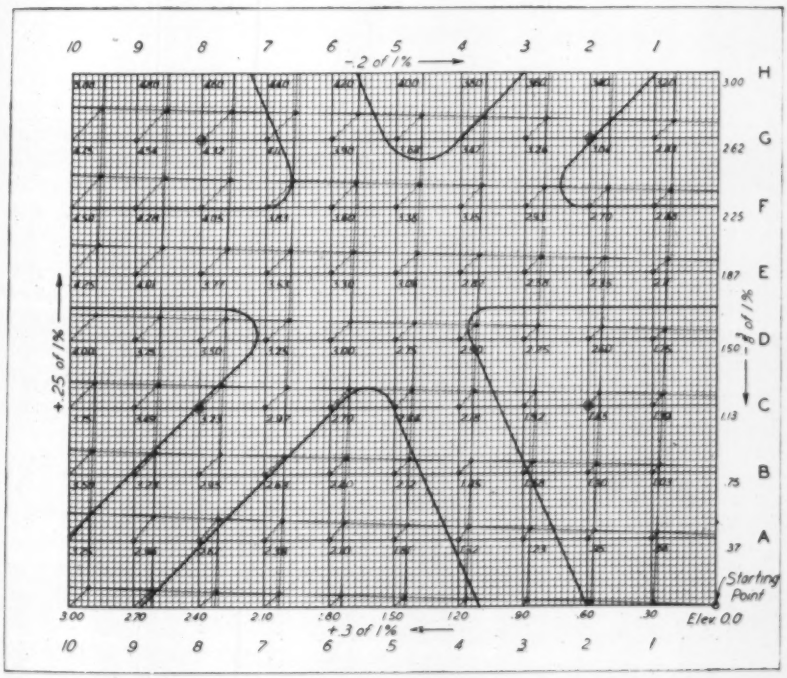

Fig. 3. Use of the isometric chart greatly simplifies the complicated task of laying out grades at runway intersections.

Another method of setting intermediate grade stakes on a constant slope is known as shooting or plunging the grade. This consists, briefly, in setting a transit over one established grade point; getting the elevation of the transit above the top of the stake; putting this elevation on the target of a level rod; placing the level rod on the distant established grade stake; adjusting the transit horizontal wire so that it cuts the target of the distant rod; moving the level rod to any intermediate position on the established line, and driving a grade stake until the target of the rod is again on the horizontal cross wire of the transit.

This isometric grade chart scheme is so simple that its use by any experienced engineer will be easy. The writer has been disposed to go into more detail than may seem necessary, in order to help out some less experienced engineer who may grasp the idea involved somewhat more slowly.

* * *

This article was prepared from a lecture given by the writer in January, 1941, as part of a National Defense Training Course on airport engineering.

Blast Used for Study of Vibration Travel Rate

Prior to a blast fired recently in the Calaveras cement quarry near San Andreas, Calif., in which 53¾ tons of high explosive was detonated, careful preparations were made to obtain data that would be useful in studying other earth shocks. Exact time of the blast (planned for 12 noon) was established by taking radio time signals at 10:00 a.m. and 1:00 p.m. at the site and comparing the readings of two chronometers over the intervening period. Thus the exact time of the blast was established as between 12.00:30.0 and 12.00:30.5 p.m. A time midway between these two was used for precise calculations.

Seismological instruments set up near by determined the amplitude, period of vibration and acceleration of the resultant ground movement. Observers in various parts of the state had been notified in advance to be prepared to observe very accurately the time at which the earth vibration was recorded on their seismographs, thus giving the rate of travel.

Designing Rigid Frames of Timber

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***Contents in Brief**—That large lumber savings are possible by using rigid frames for timber buildings is demonstrated. Tables to permit rapid design of such members are made available and a typical problem is analyzed step by step, including design of the joints.*

LARGE LUMBER SAVINGS are possible in timber construction if the buildings are designed as rigid frames. As in steel and reinforced-concrete construction, rigid frames used for wood structures result in a more uniform distribution of the internal stresses and aid in the elimination of extreme bending moments. Generally the total cost for timber rigid frames will be less than for timber designs of other types.

Rigid frames have not been more generally adopted in timber construction for three reasons: (1) the design analysis is cumbersome; (2) the formulas made available in handbooks are complicated and some are actually erroneous, and (3) tables taking into account all of the factors of economical design are not generally accessible.

Unusual loading conditions

In designing a 40x160-ft. wood-frame, two-story building for a shipyard on the Pacific Coast the writer prepared the comparative truss and rigid-frame designs illustrated by Fig. 2. The loading conditions, although not severe, were unusual for a timber structure. The two major requirements were that the first floor be free of columns and that the second floor be designed for a live load of 100 lb. per sq.ft. A 2-ton monorail on the first floor also was required, which added to the severity of the loads and made the stress analysis more complicated.

The simplified graphical analysis outlined in the author's mimeographed lectures *Graphical Methods of Analyzing Statically Indeterminate Structures;* University of California, Berkeley, Calif., 1940-1941, was followed in designing the rigid-frame layout. This design called for support of the second floor by hangers from the rigid roof bents and stiffening of the floor by unsupported ties. Rigidity at the joints of the frames was obtained by double plywood gusset plates $2\frac{5}{8}$ in. thick.

Lumber needs cut in half

On the basis of a complete study of both schemes the rigid-frame roof design required but 50 percent of the timber needed for the truss construction. Rigid frames also were more suitable for the conditions encountered. Materials needed for one bent of each design are given in Table I. Lumber for the first floor is not listed, since this quantity was the same for both schemes. Neither are the 4-in. dia. split ring connectors listed, as 112 connectors and 56 bolts were required for each layout. A further economy, other than that shown in Table I, results from the fact that there is about a 20 percent saving in the corrugated sheet metal siding with the rigid-frame building due to its lower height.

The nine 39-ft. span rigid-frame bents for the building were assembled at the site by a six-man crew in three days. An equal time was spent in the erection work, which required the use of one truck crane with a 40-ft. boom.

At the same shipyard a number of smaller rigid-frame buildings were constructed. These structures are 25 ft. wide, from 9 to 17 ft. high, and have gable roofs pitched one on eight and covered with the corrugated metal roofing. This type of building,

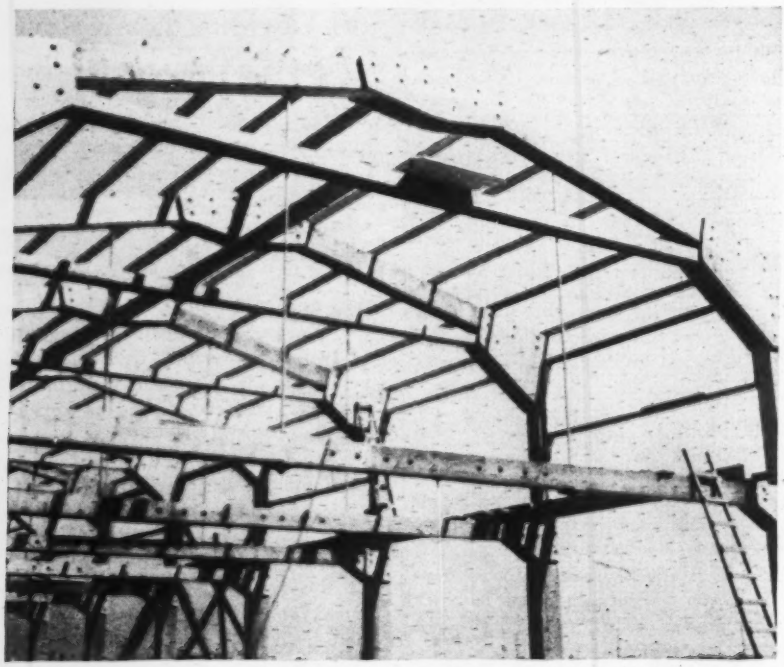


Fig. 1. Rigid frames for this 40x160-ft. building aid in supporting the second floor by means of 1½-in. dia. rod hangers. Gusset plates are of plywood and split ring connectors are used.

which is illustrated in Fig. 3, is very economical, easy to construct, and favored from the architectural standpoint because of its simplicity and functional design. Although in buildings of this size the use of rigid frames does not result in large lumber savings, the amount is still important in the present emergency, particularly if numerous structures are to be built.

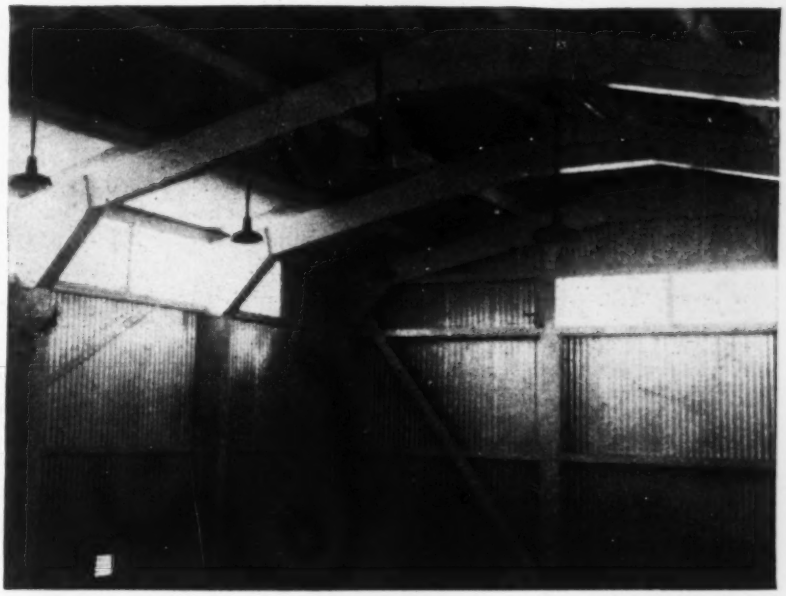


Fig. 3. Rigid frames for 25-ft. wide buildings of the type above proved very economical and easy to construct. Roof and walls are corrugated metal.

Tables permit rapid design

During the past several years the author has developed a series of tables to enable the designer to analyze a statically indeterminate series of frames as quickly and easily as simple beams. Reproduced here in Tables II, III and IV are the coefficients for rapid analysis of the bending moments and shears in ridge frames with pin supports. The tables supply values for the coefficients C_q, C_r and C_h in the following formulas.

The horizontal thrust due to the uniform vertical load of q is $H_q = \frac{i\,q\,L}{C_q}$; the horizontal thrust due to wind load w on the roof is $H_r = \frac{w\,r}{C_r}$ and the horizontal thrust due to wind load w on the side walls is $H_h = \frac{w\,h}{C_h}$. The moment diagrams are shown in Fig. 4.

The tables take into account different moments of inertia of the rafters and columns by the factors: $F_1 = \frac{i\,h}{L}$ and $F_2 = \frac{i\,r}{L}$, where $i = \frac{Ir}{I_c}$ or the ratio of the moments of inertia of the rafters to the columns, L equals the span, h is the height, and r is the total pitch in the roof (See Fig. 4).

Use of the tables can best be illustrated by an example. Assume that the Douglas fir frame shown in Fig. 4 is to be analyzed. This member has a 4x12-in. ridge girder, 4x12-in. columns, and a pitch of 1:8. The spacing of the frames is 8 ft. The vertical dead and live load equals $q = 25 \times 8 = 200$ lb. per lin.ft. of the frame and the wind load is $15 \times 8 = 120$ lb. per lin.ft. of the horizontal projection.

For use of Tables II, III and IV, $L = 25$ ft., $r = 3.125$ ft., $h = 12$ ft., $h_t = 15.1$ ft., $F_1 = \frac{12}{25} = 0.48 = 0.5$, $F_2 = 0.125$. Using these values from the tables $C_q = 8.1$; $C_r = 2.0$; and $C_h = 4.1$.

Substitution in the formulas for horizontal thrust shows $H_q = \frac{200 \times 25}{8.1} = 617$ lb.; $H_r = \frac{120 \times 3.125}{2} = 187$ lb., and $H_h = \frac{120 \times 12}{4.1} = 351$ lb. Thus the moment at the knees due to the vertical thrust on the columns from the dead and live load $= M_A, = M_B, = H_q h = 617 \times 12 = -7{,}404$ ft.-lb. and the dead and live load moment at the middle of the ridge girder $= M_C = \frac{1}{8}wL^2 - H_q h_t = \frac{200 \times 25^2}{8} - 617 \times 15.1 = +6{,}293$ ft.-lb. The moment at the left knee due to a wind from the left $= M_A, = \left[w\left(r + \frac{h}{2}\right) - \left(H_r + H_h\right)\right] h = [120(3.1+6) - 538]12 = +6.648$ ft.-lb.

At the other knee the moment from the same wind $= M_B, = (H_r + H_h)h = 538 \times 12 = -6{,}456$ ft.-lb. The

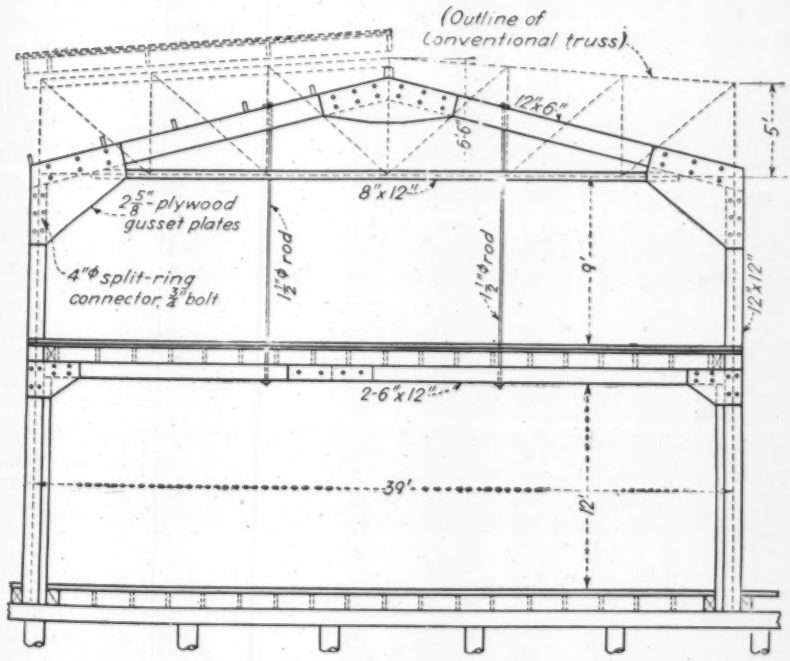


Fig. 2. Comparison of the two-story, rigid-frame design with a conventional timber truss layout.

moment at the middle of the ridge girder due to the wind on the vertical projection of the roof is $M_C = \frac{1}{4} w h_t^2 - \left(H_r + H_h\right) h_t = \frac{120 \times 15.125^2}{4} - 538 \times 15.125 = 6{,}863 - 8{,}137 = -1{,}274$ ft.-lb.

In the columns the direct or axial stress due to the vertical dead and live load is $N_q = +\frac{qL}{2} = \frac{200 \times 25}{2} = 2{,}500$ lb. and that due to the wind load $= N_w = +\frac{1}{2} w h_t^2 = \frac{1}{2} \times \frac{120 \times 15.1^2}{25} = 549$ lb.

The axial load in the girder due to the dead load $= N_q \sin a + H_q \cos a = 2{,}500 \sin a + 617 \cos a = 606 + 598 = 1{,}204$ lb. and that due to the wind is $N_W = (H_r + H_h) \cos a + (N_w) \sin a = 538 \cos a + 549 \sin a = 538 \times 0.97 + 549 \times 0.242 = 655$ lb.

Shear in the columns due to vertical dead and live load is $H_q = 617$ lb. and the shear due to wind load is $H_r + H_h = 187 + 351 = 538$ lb. In the girders the shear due to the vertical dead and live load equals $N_q \cos a - H_q \sin a = 2{,}500 \times 0.97 - 617 \times 0.242 = 2{,}276$ lb.

Thus the maximum design forces for the columns will be as follows:

Bending moment $= -7{,}404 - 6{,}456 = -13{,}860$ ft.-lb. $= -166{,}320$ in.-lb.

Direct stress $= 2{,}500 + 549 = 3{,}049$ lb.

Shear $= 617 + 538 = 1{,}155$ lb.

Maximum design forces for the girder will be:

Bending moment $= -(7{,}404 + 6{,}456) = -13{,}860$ ft.-lb. $= -166{,}320$ in.-lb.

Direct Stress $= 1{,}204 + 655 = 1{,}859$ lb.

Shear $= 2{,}276 + 402 = 2{,}678$ lb.

Combined stresses in the columns $= \frac{Mc}{I} + \frac{S}{A} = \frac{166{,}320}{79.9} + \frac{3{,}049}{41.7} = 2{,}155$ psi. and for the girder $= \frac{166{,}320}{79.9} + \frac{1{,}859}{41.7} = 2{,}082 + 45 = 2{,}127$ psi. The maximum shear stress $= \frac{3V}{2A} = \frac{3 \times 2{,}678}{2 \times 41.7} = 97$ psi.

Since the allowable axial stress for Douglas fir is $1{,}800 + \frac{1}{3}(1{,}800) = 2{,}400$ psi., and the allowable shear is 120 psi., as indicated on p. 17 of *Wood Structural Design Data*, published by the National Lumber Manufacturer's Association, 1939, the design illustrated is satisfactory.

Design of the Joints

The joints with gusset plates and split-ring connectors are to be calculated for the most unfavorable eccentric force. The eccentric force R may be replaced by a direct stress acting through the center of gravity of the connectors and parallel to its direction, and by the moment couple $M = R r$, where r is the lever arm of the eccentric force about the center of gravity. If the joint has n connectors, the shear due to the direct stress in any connector is $S_R = \frac{R}{n}$ and the direction of S_R is parallel to the eccentric force R. The shear due to bending moment will vary as the distance of the connector from the center of gravity of all the connectors.

The resisting moment of each connector is proportional to the square of the distance d from the center of gravity and equals the external moment $M = s_M(d_1^2 + d_2^2 + \ldots)$, where s_M denotes the "unit shear" due to bending moment acting at the distance of 1 in. from the center of gravity. Thus, the shear in any connector, due to bending moment is $S_{M1} = s_M d_2$, $S_{M2} = s_M d_2$, etc.

The value of unit shear s_M is calcu-

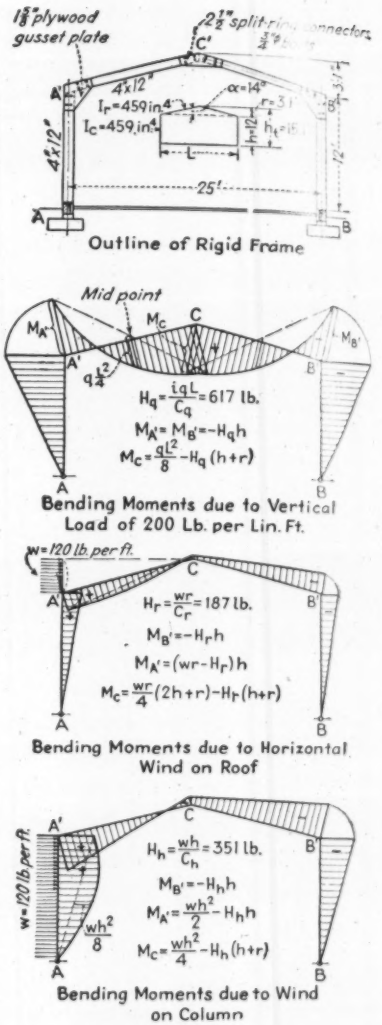

1⅛" plywood gusset plate
2½" split-ring connectors
4"x12"
α=14°
I_r=459 in.⁴
I_c=459 in.⁴
25'
Outline of Rigid Frame
Mid point
$H_q = \frac{iqL}{C_q}$ = 617 lb.
$M_{A'} = M_{B'} = -H_q h$
$M_C = \frac{ql^2}{8} - H_q(h+r)$
Bending Moments due to Vertical Load of 200 Lb. per Lin. Ft.
w=120 lb. per ft.
$H_r = \frac{wr}{C_r}$ = 187 lb.
$M_{B'} = -H_r h$
$M_{A'} = (wr - H_r)h$
$M_C = \frac{wr}{4}(2h+r) - H_r(h+r)$
Bending Moments due to Horizontal Wind on Roof
w=120 lb. per ft.
$H_h = \frac{wh}{C_h}$ = 351 lb.
$M_{B'} = -H_h h$
$M_{A'} = \frac{wh^2}{2} - H_h h$
$\frac{wh^2}{8}$
$M_C = \frac{wh^2}{4} - H_h(h+r)$
Bending Moments due to Wind on Column

Fig. 4. Detailed design of a timber frame of 25-ft. span and the moments for the different loading conditions.

TABLE I—LUMBER NEEDS IN BOARD FEET FOR A TYPICAL BENT FOR THE TWO DESIGNS.

Truss Design		Rigid Frame Design	
U. chord—2-4"x12"	325	Ridge frame—12"x16"	640
L. chord—2-4"x10"	265	Tie beam—8"x12"	256
Diag.—2-4"x10"	145	Columns—12"x12"	600
Diag.—2-4"x8"	235	Purlins, incl. bracing	290
Vert.—2-4"x8"	290	2 5/8" gusset plates	280
Columns—10"x14"	560		
Longt. bracing	250		
Purlins—3"x12"	430		
Diag. Roof sheathing	1680		
Total	4180	Total	2066

Note: Cost of the plywood gusset plates for the rigid frames was 73 c. per sq. ft., which is about $300 per 1,000 bd. ft. or three times the cost of common structural lumber, including carpenter work and erection. This greater cost is offset by a saving of common carpenter work when compared with the trusses.

TABLE II—VALUE OF COEFFICIENTS C_q FOR USE IN THE FORMULA $H_q = \frac{i\,q\,L}{C_q}$

Value of F_1	Value of F_2								
	0	0.1	0.125	0.15	0.20	0.25	0.30	0.40	0.50
0	0	0.6	0.8	1.0	1.3	1.6	1.9	2.6	3.2
0.1	1.3	1.8	1.9	2.0	2.3	2.6	2.9	3.6	4.2
0.2	2.7	3.1	3.2	3.3	3.6	3.9	4.2	4.7	5.3
0.3	4.3	4.6	4.7	4.8	5.1	5.3	5.5	6.1	6.6
0.4	6.1	6.3	6.4	6.5	6.7	6.9	7.1	7.5	8.0
0.5	8.0	8.2	8.3	8.3	8.5	8.6	8.8	9.1	9.5
0.6	10.1	10.2	10.2	10.3	10.4	10.5	10.6	10.8	11.1
0.7	12.3	12.3	12.4	12.4	12.4	12.5	12.5	12.6	12.8
0.8	14.7	14.7	14.6	14.6	14.6	14.6	14.7	14.7	14.7
0.9	17.3	17.2	17.1	17.0	17.0	16.9	16.8	16.7	16.6
1.0	20.0	19.8	19.8	19.7	19.5	19.3	19.2	19.0	18.8

TABLE III—VALUES FOR C_r FOR USE IN FORMULA $H_r = \frac{w\,r}{C_r}$

Value of F_1	Value of F_2				
	0.05	0.1	0.20	0.30	0.50
0	3.2	3.2	3.2	3.2	3.2
0.1	2.1	2.3	2.4	2.6	2.7
0.2	2.1	2.1	2.3	2.4	2.5
0.3	2.0	2.1	2.2	2.3	2.4
0.4	2.0	2.0	2.2	2.2	2.3
0.5	2.0	2.0	2.1	2.1	2.2
0.6	2.0	2.0	2.1	2.1	2.2
0.7	2.0	2.0	2.1	2.1	2.2
0.8	2.0	2.0	2.1	2.1	2.1
0.9	2.0	2.0	2.1	2.1	2.1
1.0	2.0	2.0	2.0	2.1	2.1

TABLE IV—VALUES OF THE COEFFICIENTS C_h FOR USE IN THE FORMULA $H_h = \frac{w\,h}{C_h}$

Value of F_1	Value of F_2										
	0	0.05	0.1	0.125	0.15	0.167	0.20	0.225	0.30	0.40	0.50
0.1	3.9	4.9	6.1	6.6	7.2	7.8	8.5	9.7	10.9	13.5	16.1
0.2	3.9	4.3	4.8	5.1	5.4	5.6	5.9	6.5	7.1	8.3	9.6
0.3	3.8	4.1	4.4	4.6	4.8	4.9	5.1	5.5	5.8	6.6	7.4
0.4	3.8	4.0	4.2	4.3	4.4	4.5	4.7	4.9	5.2	5.8	6.4
0.5	3.7	3.9	4.1	4.1	4.2	4.3	4.4	4.6	4.8	5.3	5.7
0.6	3.7	3.8	4.0	4.1	4.1	4.2	4.3	4.4	4.6	4.9	5.3
0.7	3.7	3.7	3.9	3.9	4.0	4.1	4.2	4.3	4.4	4.7	5.0
0.8	3.7	3.7	3.8	3.9	3.9	4.0	4.0	4.1	4.2	4.5	4.8
0.9	3.6	3.7	3.8	3.8	3.9	3.9	4.0	4.0	4.1	4.4	4.6
1.0	3.6	3.7	3.8	3.8	3.8	3.9	3.9	4.0	4.1	4.2	4.5

lated from the preceding equation or the relation $s_M = \frac{M}{d_1^2 + d_2^2 + \ldots}$. Now, both shear values S_R and S_M due to direct stress and bending moment are to be combined as to both magnitude and direction, as illustrated in Fig. 5.

In the example illustrated the most unfavorable loading conditions occur at the top of the column (Fig. 5). At that joint 8 split-ring connectors of 2½-in. dia. and with four ¾-in. bolts are provided. All the connectors are the same distance from the center of gravity. Thus $d^2 = 3^2 + 6^2 = 45$ in.^{2} The distance between the base of the column and the center of gravity of the connectors is 12 — 1.5 = 10.5 ft. The eccentric force equals the total shear (see previous computation) or 1,155 lb. and combined with direct stress equals 3,049 lb.

The bending moment about the center of gravity of the joint is: $M = 1{,}155 \times 10.5 \times 12 = 145{,}530$ in.-lb. Using the formula of resisting moment, the "unit shear" is $s_M = \frac{145{,}530}{8 \times 45}$ = 405 lb. The distance between each connector and center of gravity is $\sqrt{45} = 6.7$ in. and the shear due to the bending moment, acting normal to the lever arm about the center of gravity, is $S_M = 405 \times 6.7 = 2{,}715$ lb.

The total direct force, resulting from both shear and direct stress, is $R = \sqrt{3{,}049^2 + 1{,}155^2} = 3{,}260$ lb. and the shear in each connector $S_R = \frac{3{,}260}{8} = 408$ lb. Both values, $S_M = 2{,}715$ lb. and $S_R = 408$ lb., are to be combined graphically, since they act along different lines. The total shear in connectors will be slightly different, the average value being about 2,800 lb. and the maximum value about 2,900 lb., acting at an angle of approximately 60 deg. to the grain. The allowable load in pounds per 2½-in. dia. connector with a ½-in. dia. bolt, for a lumber thickness of 1⅝ in. in two faces, and at angle of load to grain of 60 deg. is 2,223 plus 30 percent due to the combination of wind, live and dead load or 2,890 lb., according to *Manual of Timber Connector Construction*, published by National Lumber Manufacturers Association. Thus, the joint chosen is satisfactory. Since ¾-in. bolts are provided, the factor of safety is greater.

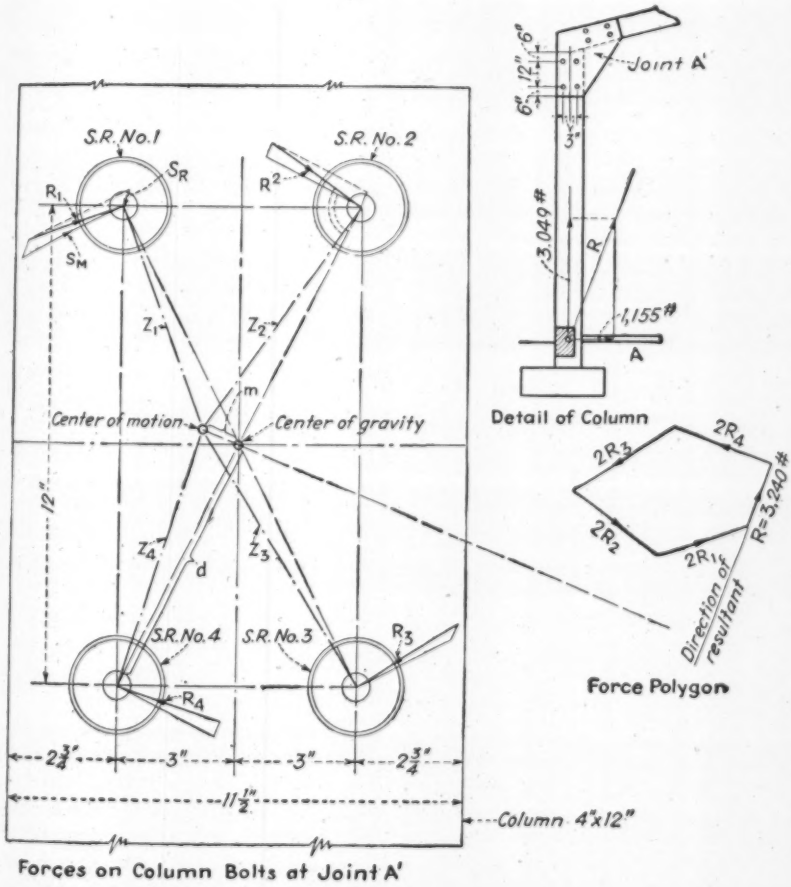


Fig. 5. A check as to the proper design of Joint A' required the work above.

Sludge Gas Produces Electric Power in England

Conversion of sludge gas to power produced 3,750,000 units of electricity at the sewage disposal works of Birmingham, Tame and Rea Drainage Board in England during 1940, according to *The Surveyor*. Gas production totaled 82,259,424 cu.ft., and this was used to operate eleven gas engines of 2,370 hp. The engines are attached to generators that supply power and lighting throughout the treatment works.

Centralized Organization Speeds Industrial Plant Building Program

George Parkman

Director, Building Construction and Maintenance
Westinghouse Electric & Mfg. Co.
Pittsburgh, Pa.

***Contents in Brief**—Faced with the difficulties of carrying out an unprecedented building program, involving a monthly expenditure of about $2,500,000 to meet wartime production schedule demands, the Westinghouse Electric & Mfg. Co. set up a centralized construction department to handle all phases of the problem. Departmental set-up includes design, construction, cost control, maintenance and plant engineering.*

IN ORDER to better coordinate a vast plant expansion program due to war production, the Westinghouse Electric & Manufacturing Co. organized a Construction Department in the middle of 1940. Starting with a group of four men, the department now numbers about two hundred, and is designing and constructing factory buildings at a rate of approximately $2,500,000 per month. Duties include the design and supervision of building construction and alterations, manufacturing problems in connection with buildings, and building maintenance.

Defects in old system

Prior to 1940 building projects at the company's various plants throughout the country were handled almost exclusively by the local management, at times assisted by the Works Engineering Department at East Pittsburgh.

The original system had several obvious flaws; among them being the following:

No design or specification standards were applicable throughout the company because of the wide variety of architectural and engineering talent retained by the local plant managements. Further, the shifting of managers from one plant to another created confusion and promoted inefficiency.

No universal method of controlling costs in relation to appropriations was possible. Accounting methods employed were more of a manufacturing than a construction nature.

Group purchasing of materials, equipment and service could not be carried on in the interests of greatest economy.

There was no centralized organization through which all building problems could be cleared, so that the different divisions of the company were unable to capitalize on the design or problem solutions of one another.

How new system is set up

The purpose in establishing a centralized construction department was to eliminate the defects existing in the old system, and to coordinate all building activity to provide the greatest speed, efficiency and economy.

As shown by the accompanying chart, the construction department is divided into five main sections—building design; cost control; field construction; plant engineering, and maintenance—with the author as director, and H. A. Saurbrey as chief construction engineer.

The scope and activity of each section may be detailed as follows:

Design—Responsibility of this group is to supervise architects and engineers retained on design work, or with its own personnel to design building projects. Included in this personnel are architectural designers, structural, plumbing, heating, electrical, ventilating and air-conditioning engineers, so that a complete design can be made within the organization. Contact is maintained with local plants and construction projects by means of liaison engineers.

Cost Control—The function of this section is to prepare preliminary estimates upon which an appropriation request can be based, to submit final estimates for the purpose of starting construction; to handle all contract writing, and change-order negotiations. In conjunction with the accounting department, monthly financial reports are prepared, covering each building of each project; these are submitted to management, and a condensed summary is prepared for the top executives of the company. Obtaining priority ratings, and handling government reports and questionnaires relative to building construction, all come within the scope of this division. It also buys construction materials and equipment.

Construction—This section through its construction project managers and superintendents in the field, manages the actual field work. Where work is let on a general contract basis, the superintendent acts in the capacity of an engineer and owner's representative, cooperating with the accounting department in furnishing cost data. Where work is let on a separate contract basis, superintendents act as the managers of construction. Attached to the construction project manager are a crew of expeditors who work from the Pittsburgh office, or are attached directly to the job as the occasion demands.

Maintenance—Studies relating to maintenance problems, writing of specifications covering repairs, and supervision of all maintenance work are carried out by this section.

Plant Engineering—All plant processing problems relating to building construction are referred to this section. This involves decisions covering such matters as air compressor installations, baking ovens, varnish tanks, service piping, and power plant equipment.

Operation of the construction department is planned to eliminate as much guesswork as possible, and to control the cost throughout the entire life of each project so the completed structures will come well within the estimated budget. To this end the director of the department maintains close contact with every phase of operations through the medium of a "control desk." All papers relating to each project in the planning stage and during construction are transferred by means of transmittal sheets, one copy of which is deposited with the "control desk." The information from these sheets is recorded on appropriate ledger forms, thus providing a complete record or inventory of all activities of the department. This system furnishes a rapid means of supervising and surveying the situation whenever the management should so desire.

It should be pointed out that the control organization exercises no administrative function. It issues no orders to anyone, receives no instructions from anyone but the director or his deputy. It does not check the correctness of the estimates nor the propriety of the plans and specifications. It merely records the facts that certain instruments have been received or shipped.

The items inventoried are as follows: Request for preliminary plans and estimates; transmittal of preliminary estimates; request for final plans, specifications and estimates; transmittal of final plans and specifications; request to take bids; a "project summary" by means of which the financial status of the job is at all times exhibited to view; notice to begin work, and general transmittal sheets by means of which any papers emanating from the drafting room may be shipped.

Procedure followed

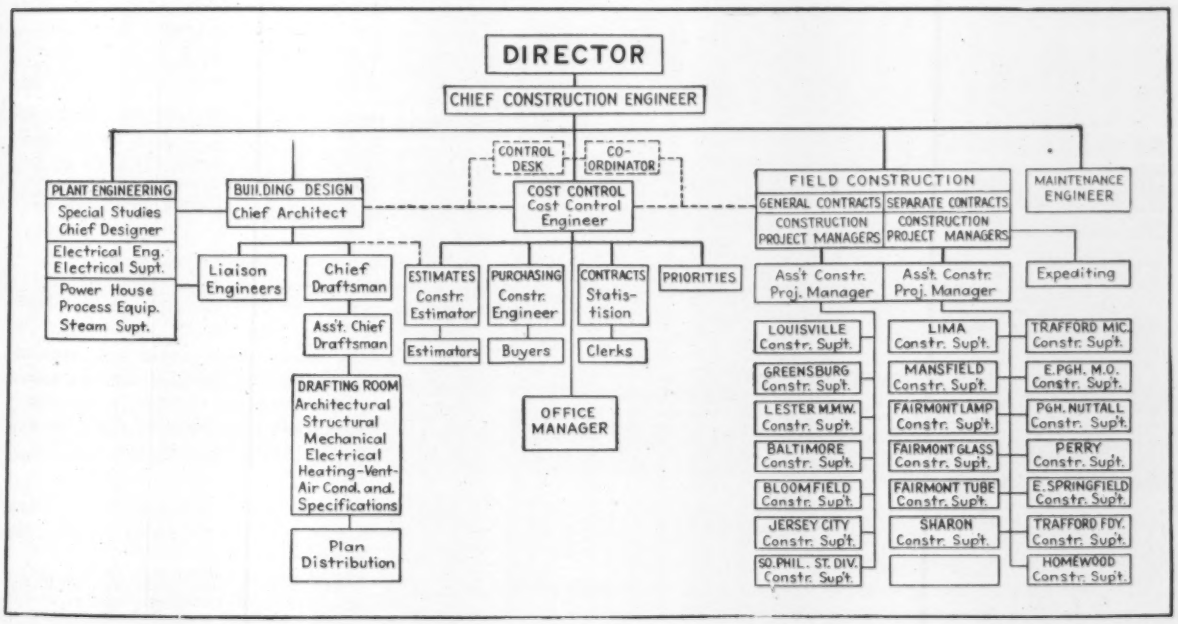
How the construction department functions is best understood by taking a typical project example and describing the various phases of the work from the time of its initial conception through to completion. For instance, when the local management of any one of the company's various plants conceives a project to be necessary, they contact the construction department.

A meeting is held where all phases of the project are discussed. Then an estimate is prepared for which an appropriation is granted covering the preparation of preliminary plans and estimates for appropriation request purposes only. These studies may include test boring data, investigation of population centers, availability of transportation facilities to the site, and local utilities—so that when these plans and estimates are complete they represent an accurate picture of the project. The plans also are discussed with other interested parties such as the plant layout and real estate departments. The entire project then is approved by the local management or is revised until a plan acceptable to all parties is obtained.

A preliminary cost estimate then is submitted to the board of directors for their approval. If the project is accepted and an appropriation granted, plans and specifications are completed, and a final estimate is submitted to the local plant management. If approved, the construction purchasing group, acting under the cost control section, either lets the construction work on a general contract basis, or awards separate contracts.

However, if any changes in the scope of the work are to be made, which were not covered in the first estimate, then such changes must be approved by the vice-president in charge of the division involved. These changes are submitted in the form of change estimates, and no work is started until approval has been received. In the preliminary estimates a contingency item is set up to cover such conditions as increased labor and material cost, overtime for unforeseen foundation troubles, and other items against which change-orders can be applied.

While this system and the procedure followed by no means may represent the ultimate in best practice, it has more than proved its value in carrying out the purpose for which it was created.



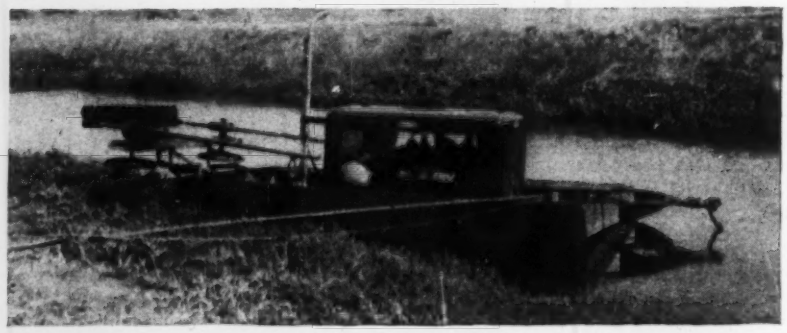
Organization chart showing departmental set-up of the Westinghouse Electric & Mfg. Co. construction department.

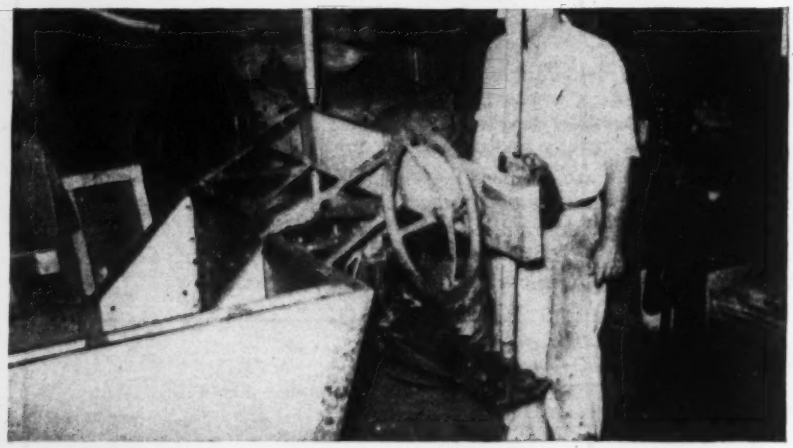
From Field and Office

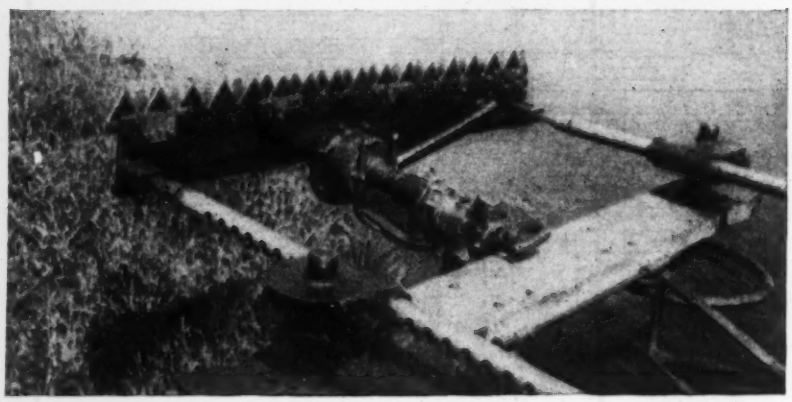
WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Floating Mower Removes Grass from Irrigation Ditches

To remove grass from irrigation ditches the Clear Lake Irrigation District at Woodland, Calif., has developed the unusual mower shown in the accompanying photographs. In the past the grass was cut by hand scythes and since the ditches vary in depth from 3 to 6 ft. this work was an expensive job. The vegetation grows very rapidly and usually requires cutting every three to four weeks for the entire irrigation season, which is from February to October.







Barge with air-driven mower sickle greatly reduces cost of cutting weeds in irrigation ditches. In the top photograph the sickle has been raised clear of the water and the in center picture the cutting blade and the air motor is in the lowered position. Depth at which the blade operates is controlled by adjusting the length of the two supporting pipes, as illustrated by bottom photo.

A flexible and portable unit

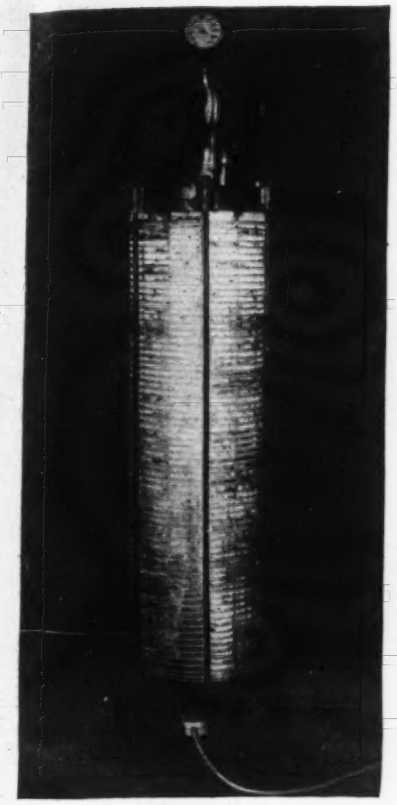
The floating unit, as evidenced by the accompanying snapshots, was both flexible and portable and could be operated under a wide range of conditions. A flat-bottomed barge large enough to hold a 60-cu.ft., engine-driven air compressor but not too wide to fit the main ditch and most of the important laterals was first built. The barge was fitted with axles and wheels that could easily be slipped on and off to permit the barge to be moved readily from ditch to ditch and around any obstructions that might be in the way. The unit was either poled or moved by trucks running along the banks of the ditch, but there is no reason why the barge could not be operated just as easily with an outboard independent motor.

A sickle bar complete with sickle was removed from a horse-drawn mower and modified as necessary for cutting grass under water. The bar was next attached to the barge on slides so that it could be quickly raised and lowered, locked at any level, or locked on either side of the center line.

Simple mechanism

A piston-type air drill or air motor was mounted on the mower bar for driving the cutting blade; by mounting the motor directly on the sickle bar the resulting flexibility permitted operation of the bar in any of the desired positions. An air-hose connection between the compressor and the air motor eliminated the need for flexible shafts or other intricate transmission.

This description was prepared by Joseph P. Burdett of Whittier, Calif., in a contest that was recently sponsored by the Compressed Air Institute.



WOODEN WATER TANK SOLVES PROBLEMS OF CRITICAL MATERIALS

A wooden hot water tank that is expected to save critical materials has been developed for use in homes by the Peterborough Utilities Commission, Peterborough, Canada. Developed in conjunction with one of the manufacturers of wood stave pipe, the tank has cast-iron ends held in place by steel rods.

When it was tested under the standard waterworks pressure of 70 psi., the tank developed a few small leaks but no serious trouble developed that could not be overcome in a very short time.

The wood tank is expected to reduce the high mortality in tanks for the home. With metal tanks the dissolved oxygen in the water sets up corrosion when the water is released at high temperatures under pressure, and the life of a steel tank is not much over five years. It is believed the wood tank will obviate this corrosion and serve the purpose equally as effective as a steel tank.

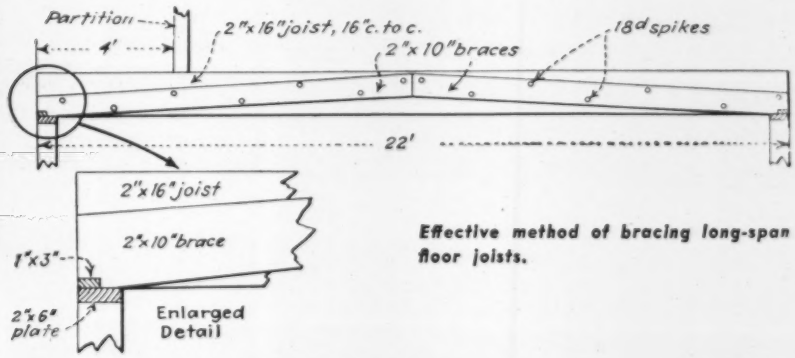
A further advantage of the wood tank is that it does not need to be insulated, thus effecting another saving in critical materials. — R. L. Dobbin, general manager, Peterborough Utilities Commission.

Truss-Braces on Joists Steady 22-Foot Spans

A two-story wood-frame residence recently built in San Francisco is of a design such that it was desirable to use floor joists of 22-ft. span in one part of the structure and to carry a partition, in the story above, 4 ft. from one end of the long joist span. To prevent any tendency to sag or sway and to give the floor maximum rigidity, each joist was braced by two inclined members spiked firmly to the joists and wedged tightly into place at ends and midspan, as shown in the sketch.

With this arrangement 2x16's were used for the joists and 2x10's for the braces. It was necessary to use kiln-dried lumber to avoid end shrinkage which would have interfered with a firm bearing. The use of the 1x3's on the plates at both ends and the notching of the braces to fit them are important as is also the spiking together of braces and joist. The nails were put in, staggered from top to bottom of the brace, about 2 ft. apart.

This bracing method, which was devised by Robert McCarthy, San Francisco contractor, has proved to be highly satisfactory and has given a more rigid structure than would have resulted, it is believed, if an equal or greater amount of material had been used in the joists themselves.

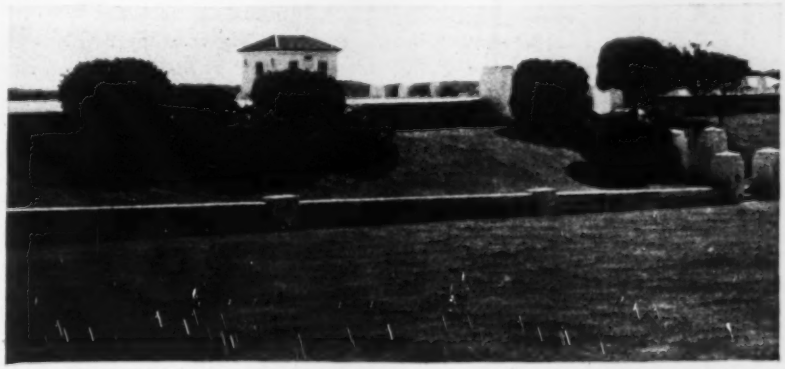


Effective method of bracing long-span floor joists.

Landscaped Reservoir Does Not Invite Vandalism

Fences designed to be climb proof and topped with several rows of barbed wire—which so frequently encircle a city's reservoir—are in sharp contract to the attractively landscaped slopes and green lawns that surround the above 9-mg. reservoir at San Francisco.

Strangely enough, the climb-proof fences seem to be a challenge to the younger generation and mischief is done much more frequently where such obvious means are taken to prevent access of unauthorized persons. The reservoir has not been subject to: (a) rocks thrown on the reservoir roof, (b) breakage of screens in the ventilator openings, (in this case sheltered by louvers), nor (c) other nuisances that have frequently been reported in the city's reservoirs protected by high fences.



An example of how reservoir property can be made attractive with decreased temptation to mischievous destruction.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

Data on Welding

WELDING HANDBOOK—1942 Edition. 1,593 pp. American Welding Society, New York. Price to non-members—$6 in U. S. A. $6.50 elsewhere.

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE—1,267 pp. The Lincoln Electric Co., Cleveland, Ohio. $1.50 in the U. S.A.; $2 elsewhere.

These new editions of the two most complete handbooks on welding design and field technique are made available at a time when the need for welding information is at a peak. The Lincoln Electric Company's "Procedure Handbook of Arc Welding" is greatly enlarged over previous editions, but continues to emphasize new techniques to improve speed and efficiency, and to reduce costs. The 1942 "Welding Handbook" of the American Welding Society continues to present the best scientific information on welding, both arc and gas, that is available in published form. Both of these books have an important function to perform in furthering our war effort.

Science of Concrete Making

HANDBOOK FOR CONCRETE AND CEMENT—370 pp. Central Concrete Laboratory, Corps of Engineers, U. S. Army, 320 Washington St., Mt. Vernon, N. Y. $3. Make money orders payable to the Treasurer of the United States *at New York.*

The tests and procedures by which the Corps of Engineers controls the quality of the concrete going into the many structures under its jurisdiction are fully set forth in this volume, the first that has been published for general distribution. First developed in 1939 for exclusive use of the U. S. Engineer Department, it has grown into a handbook of wide utility. The specifications and tests are grouped in four classifications relating to aggregates, concrete, cement and water. Federal and A.S.T.M. specifications of cement are also included. The handbook is a product of the Central Concrete Laboratory of the North Atlantic Division, U.S.E.D., of which Charles E. Wuerpel is the head, and in the words of the introduction "it is the hope that it will provide some additional impetus to the progress being made toward standardization of practice and a more general understanding of the control necessary in the manufacture of *durable* concrete."

Structural Design

ANALYSIS OF RIGID FRAMES—By A. Amirikian. 396 pp. Superintendent of Documents, Washington, D. C. $1.

STEEL AND TIMBER STRUCTURES—2nd Edition. 733 pp. McGraw-Hill Book Co., New York and London. $6.

STRUCTURAL THEORY—By Hale Sutherland and Harry L. Bowman. 368 pp. John Wiley & Sons, New York; Chapman & Hall, London. $3.75.

ELEMENTARY STRUCTURAL ANALYSIS AND DESIGN—By Linton E. Grinter. 383 pp. The Macmillan Co., New York and London. $3.75.

Four books, two of which are new while two are new editions, have recently been made available for the structural engineer's library. Of the four, that on "Analysis of Rigid Frames" by A. Amirikian, principal engineer in the Navy Department's Bureau of Yards and Docks, is strictly a designer's book, while the other three are more of textbook character. Mr. Amirikian does an admirable job of presenting the fundamentals of indeterminate design as they relate to actual design procedures. Particularly notable are the equation procedures, developed in great detail, for utilizing the slope deflection concept in solving problems of sidesway in such frameworks as rectangular and trapezoidal bents, Vierendeel trusses, and gable, lean-to and hip bents.

The new edition of the well known Hool & Kinne book "Steel and Timber Structures," revised by R. R. Zipprodt and Prof. D. M. Griffith, brings much of its contents into line with modern practice. Two criticisms that could be made of this new edition are that too many of the old illustrations and drawings are retained, and that data on structural welding is omitted.

"Structural Theory," by Sutherland and Bowman, differs from the previous edition principally in the greater emphasis that is placed on rigid frame design by the methods of moment distribution and column analogy developed by Prof. Hardy Cross.

Prof. Grinter's new book "Elementary Structural Analysis and Design" is largely a reorientation of information contained in the two admirable books he has already published, "Theory of Modern Steel Structures" and "Design of Modern Steel Structures." The purpose of the new book is to present this information from a more elementary point of view as an aid to students and engineers who require structural design knowledge, yet have no need to become specialists in the subject.

Economy in Engineering

INTRODUCTION TO ENGINEERING ECONOMY—By Baldwin M. Woods and E. Paul De Garmo. 441 pp. The Macmillan Co., New York and London. $4.

While written as a textbook for use in engineering schools, this book should prove useful to engineers wishing to broaden their understanding of engineering economy because it is designed to provide the students with knowledge of fundamental principles. Discussed are such matters as financing engineering enterprises; valuation and depreciation; the relationship of accounting to economic studies; capacity, load and future demand factors; the use of graphical methods of analysis; and statistical methods in engineering quality control. A chapter of special interest to older engineers is the one entitled "Economy Studies of Governmental Projects."

Miscellaneous Notes on Booklets and Reprints

A LARGE FOLDED SHEET entitled "Post-War Agenda" has been issued by the National Resources Planning Board. Under such headings as "Plans for Demobilization" and "General Plans for Public Activity," are set forth the objectives of post-war planning and the problems presented in formulating plans for their attainment. Copies may be obtained from the office of the board in Washington.

CLOSELY RELATED to the Planning Board's "Post-War Agenda" is a

(*Continued on p.* 130)

THESE are the real footsteps to Victory . . . the marching feet of fighting men, now heard across the embattled continents. Yet these men cannot fight unaided. Each step a soldier takes needs the fullest backing here at home. We must sacrifice, we must work, we must save.

Here, for example, are four very simple conservation steps which you can take on the march to final victory. Follow them and make your storage batteries last longer. Buy to last, and save to win!

STEP No 1 Keep adding approved water at regular intervals. Most kinds of local water are safe in an Exide Battery. Ask us if yours is safe.

STEP No 2 Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.

STEP No 3 Keep the battery fully charged—but avoid excessive overcharge. There's always a right way to do any job, and a storage battery will last longer when charged at its proper voltage.

STEP No 4 Keep records of water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings. *Know* what's happening!

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for Booklet Form 1982.

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BATTERIES

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

HIGHWAY, NEBRASKA

OWNER: Nebraska Department of Roads and Irrigation, Lincoln. W. G. Scott, State Highway Engineer.

PROJECT: Construction of 5.7 miles of concrete pavement in connection with road improvement in Lancaster County, Nebr. Involves necessary grading, removal of old structures, approximately 112,000 square yards of concrete paving, curbing, sidewalks, concrete and brick driveways, culverts, sewers, and roadside improvement. Alternates were allowed for the sewer pipe, either vitrified clay or cement concrete. Both bidders submitted their bids on the latter basis.

CONDITIONS: Contractor to furnish all materials. Rail and highway transportation facilities available. Wage rates specified are: skilled labor, $1.25 per hour; semi-skilled, 85c.; and common labor, 50c.

BIDS: Two bids were received September 3, 1942, the contract low of $545,358, and $634,606.

LIST OF BIDDERS:

1. Abel Constr. Co., and Dobson & Robinson, Lincoln, Nebr. (contract) $545,358
2. Inland Construction Co., Omaha, Nebr. 634,606

Item	Quan.	Unit Prices (1)	(2)
1. Clearing and grubbing	Lump Sum	$224.85	$224.85
2. Excavation	2,520 c. y.	.31	.40
3. Water, applied	5,252 M gal.	2.00	2.00
4. Concrete protection work	270 s. y.	3.00	2.20
5. Relay rein. conc. pipe, drives	40 l. f.	1.00	1.00
6. Relay corrugated metal pipe, drives	144 l. f.	.75	1.00
7. Remove old structures	38 ea.	10.00	50.00
8. Remove old structure, Sta. 22	1 ea.	10.00	25.00
9. Remove old structures, Sta. 198, 218 and 232	3 ea.	10.00	25.00
10. Remove old structures, Sta. 236 and 258	2 ea.	25.00	25.00
11. Remove old structure, Sta. 237	1 ea.	25.00	25.00
12. Remove old structures Sta. 238, 242 and 260	3 ea.	10.00	25.00
13. Remove old structure, Sta. 242	1 ea.	25.00	25.00
14. Concrete pavement, Class C, E, or F conc.	112,277 s. yd.	2.87	3.22
15. Comb. conc. curb and gutter	2,675 l. f.	1.25	1.22
16. Precast concrete curb	3,956 l. f.	1.00	1.10
17. Island curb	2,786 l. f.	.30	.25
18. Concrete sidewalks	1,280 s. f.	.18	.22
19. Concrete driveways	82 s. yd.	2.30	2.50
20. Brick driveways	186 s. y.	1.90	2.50
21. Relay precast concrete walks	2,576 s. f.	.13	.25
22. Concrete, headers	1.2 c. yd.	15.00	20.00
23. Remove old headers	8 ea.	8.50	10.00
24. Remove concrete pavement	299 s. y.	.65	.50
25. Remove brick surface course	45,438 s. y.	.75	1.00
26. Remove concrete base course	36,137 s. y.	.40	.50
27. Remove concrete driveways	84 s. y.	.50	.50
28. Remove comb. conc. curb and gutter	284 l. f.	.25	.20
29. Remove concrete curb	31 l. f.	.20	.25
30. Remove walks	2,923 s. f.	.05	.10
31. Excavation for culverts	2,510 c. y.	2.10	2.50
32. Excavation, for sewers	1,605 c. y.	2.10	2.50
33. Excav. for catch basins and inlets	150 c. y.	2.10	2.50
34. Class A, C or H concrete, culv. and headwalls	870.37 c. yd.	36.50	40.00
35. Cl. A, C or H conc., catch basins and inlets	12.66 c. y.	50.00	45.00
36. Reinforcing steel, catch basins and inlets	160 lb.	.10	.08
37. Relay reinforced concrete pipe	110 l. f.	1.50	2.00
38. Relay concrete sewer pipe	192 l. f.	1.50	2.00
39. Relay vitr. clay pipe	95 l. f.	1.50	2.00
40. Untreated timber	0.863 Mbm.	150.00	200.00
41. Treated timber	6.637 Mbm.	200.00	275.00
42. Treated timber posts	200 l. f.	1.00	1.25
43. Cl. A, C or H concrete, elbows	7.34 c. y.	50.00	45.00
44. Cast steel grates	650 lb.	.25	.30
45. Steel checker plate curb inlet covers	448 lb.	.25	.30
46. Treated timber covers, inlets and junction boxes	0.389 Mbm.	200.00	250.00
47. Remove old structure, Sta. 25	1 ea.	75.00	100.00
48. Remove old structure, Sta. 71	1 ea.	300.00	200.00
49. Remove old structure, Sta. 78 Lt.	1 ea.	25.00	35.00
50. Remove old structure, Sta. 78 Rt.	1 ea.	25.00	30.00
51. Remove old structure, Sta. 78+59 Rt.	1 ea.	25.00	30.00
52. Remove old structure, Sta. 127	1 ea.	125.00	100.00
53. Remove old structure, Sta. 145	1 ea.	200.00	150.00
54. Remove old structure, Sta. 156	1 ea.	150.00	175.00
55. Remove old structure, Sta. 246	1 ea.	175.00	150.00
56. Remove old headwalls, pipe	25 ea.	15.00	25.00
57. Remove old endwalls, culverts	6 ea.	75.00	100.00
58. 12-in. culvert pipe	244 l. f.	1.60	1.75
59. 18-in. culvert pipe	1,232 l. f.	2.30	2.50
60. 24-in. culvert pipe	412 l. f.	3.55	3.40
61. 30-in. culvert pipe	408 l. f.	4.75	4.60
62. 36-in. culvert pipe	188 l. f.	6.00	5.50
63. 48-in. culvert pipe	88 l. f.	10.00	9.50
64. 12-in. cem. conc. sewer pipe	160 l. f.	1.40	1.50
65. 18-in. cem. conc. sewer pipe	136 l. f.	2.20	2.50
66. 24-in. cem. conc. sewer pipe	780 l. f.	3.20	3.50
67. Seeding, Type A	41.1 ac.	35.00	40.00
68. Seeding, Type B	4.3 ac.	60.00	75.00
69. Mulching	20,592 s. y.	.15	.15
70. Mulch covering	286 c.y.	4.00	4.00
71. Sodding	11,884 s. y.	.50	.50

HIGHWAY IMPROVEMENT, NORTH CAROLINA

OWNER: North Carolina State Highway and Public Works Commission, Raleigh. W. V. Baise, State Highway Engineer.

PROJECT: Grading, soil type base course, and sand asphalt surfacing 3.42 miles of roadway from a point on U. S. Highways 74 and 76, 685 ft. north of Bradley's Creek Bridge, to U. S. Highway 17 in New Hanover County, N. C. Includes all necessary excavation, overhaul, base course, surfacing, drainage structures, fencing, right-of-way markers, and creosoted structural timber for completion of project.

CONDITIONS: Contractor to furnish all materials and complete job in 100 working days. Rail and highway transportation facilities available. Minimum wage rates are: skilled labor, 55c. per hour; semi-skilled, 35c.; and common labor, 30c.

LIST OF BIDDERS: (Bids received October 14, 1942)

1. F. D. Cline, Raleigh, N. C. (low bidder) $121,933
2. J. P. McGuire Constr. Co., Durham, N. C. 140,497

Item	Quan.	Unit Prices (1)	(2)
1. Clearing	50 ac.	$200.00	$250.00
3. Grubbing	42 ac.	200.00	200.00
4. Unclassified excavation	46,800 c. y.	.48	.55
5. Drainage ditches	1,400 c. y.	.95	1.00
6. Borrow excavation	24,800 c. y.	.55	.60
7. Overhaul, special (one-half mile)	40,000 c. y.	.06	.06
8. Topsoil shoulders (select. mat'l)	1,600 c. y.	1.00	1.00
9. Soil type base course	11,800 c. y.	.90	.95
10. Sand asphalt base course, 2-in.	45,900 s. y.	.60	.75
11. Sand asphalt surface course, 1-in.	45,900 s. y.	.32	.40
12. Class C concrete, headwalls	15 c. y.	25.00	30.00
13. 30-in. reinforced concrete pipe	80 l. f.	8.00	7.00
14. 36-in. reinforced concrete pipe	132 l. f.	11.00	10.00
15. 42-in. reinforced concrete pipe	60 l. f.	15.00	14.50
16. 15-in. plain concrete pipe	16 l. f.	2.00	2.25
17. 18-in. plain concrete pipe	388 l. f.	3.50	3.50
18. 24-in. plain concrete pipe	208 l. f.	5.00	4.50
19. Relaid pipe, 18-in. or less	25 l. f.	2.00	1.50
20. Relaid pipe, more than 18-in.	25 l. f.	4.00	3.00
21. Shoulder drains	70 c. y.	6.50	6.00
22. Reset comb. barb- and hog-wire fence	500 l. f.	.05	.05
23. Right-of-way markers	48 ea.	3.00	3.00
24 Creosoted structural timber	13.4 M bm.	200.00	250.00

CORE BORINGS LIBERTY DAM, MARYLAND

OWNER: City of Baltimore, Board of Awards, Baltimore, Md. Leon Small, water engineer.

PROJECT: Earth and rock core borings for Liberty Dam on the North Branch of the Patapsco River, Baltimore and Carroll Counties, Md.

CONDITIONS: Contractor to furnish all materials and complete work in 90 consecutive calendar days. Rail and highway transportation facilities available. Wage rates (Baltimore) are: skilled labor, $1.37½ to $1.80; and common labor, 70c.

BIDS: Three bids were received September 9, 1942, ranging from the contract low of $26,400 to $29,816.

LIST OF BIDDERS:

1. Sprague & Henwood, Scranton, Pa. (contract) $26,400
2. Riley Engineering & Drilling Co., Brooklyn, N. Y. 27,383
3. Giles Drilling Corp., New York, N. Y. 29,816

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Earth borings for 2⅛-in. or larger cores	300 l. f.	$8.25	$8.60	$9.47
2. Earth borings for 8-in. or larger cores	50 l. f.	12.00	12.01	12.00
3. Rock borings, 2⅛-in. or larger	2,500 l. f.	8.25	8.60	9.47
4. Rock borings, 8-in. or larger	225 l. f.	12.00	12.01	12.00

NO WINTER SLOW-DOWN ON VITAL WAR WORK

'INCOR' hardens three times as fast . . . keeps jobs on schedule even in sub-freezing weather . . . cuts heating costs by up to 60% . . . saves time, money, worry. High-speed concreting . . . half as many forms . . . use 'Incor' for year-around war-speed.

KEEP 'EM POURING WITH 'INCOR'

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS . . 15 MODERN MILLS . . 25-MILLION BARRELS ANNUAL CAPACITY

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

DECEMBER CONSTRUCTION material prices reveal only minor changes from last month's levels. Paving brick is up $3.00 per M in Baltimore, and wood paving block is higher in Philadelphia and Minneapolis as a result of increased impregnating oil prices. Sand, gravel and ready-mixed concrete are higher in Detroit due to greater difficulty in obtaining in winter, and in the latter case for heating. Sand is up 5c. per ton in Montreal, the only change in the Canadian city.

Short leaf yellow pine is up $1.00 to $1.50 per M ft. in St. Louis. Both Douglas fir and long-leaf yellow pine timbers are higher in Boston. Treated and untreated railroad ties are also higher there. Concrete sewer pipe is off 10c. per foot on the 12-in. size in St. Louis, but up 50c. on the 24-in. size.

Construction wage rates for both common and skilled labor are unchanged from a month ago in all reporting cities.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT (Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted)			SAND AND GRAVEL (Per ton, carload lots)			CRUSHED STONE (Per ton, carload lots)		CRUSHED SLAG (Per ton, carload lots, f.o.b. plant)		CONCRETE (Ready Mixed 1:2:4, 50 c.y. or more, delivered)
	Cloth Bags *a*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$8.04
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.25
Birmingham	2.50	2.25	....	1.75	1.75	1.50	.85	1.00	.90	1.15	5.80
Boston	2.75*b*	2.50*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.39	2.14	....	1.50*i*	1.50*i*	1.30*i*	1.75*i*	1.75*i*	1.75*i*	1.75*i*	7.30*i*
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	6.20
Denver	3.08	2.88	....	1.20	1.40	1.25	1.65	1.75	....	....	7.25
Detroit	2.40	2.15	1.95	2.50	2.25	1.65	2.25	2.25	2.00‡	2.00‡	7.00
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1,91	1.91	....	....	7.50*n*
Los Angeles	2.80*v*	2.20*v*	....	1.20	1.20	1.15	1.15*f*	1.20*f*	....	....	6.65
Minneapolis	2.90	2.65	....	1.00*k*	1.00*k*	.25*k*	1.00*k*	1.00*k*	....	....	7.35*j*
Montreal	....	1.95*rs*	1.79*rs*	....	....	1.30‡*t*	1.20‡*ct*	1.30‡*ct*	....	....	7.90*ts*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	....
New York	2.66‡	2.41‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	7.25*k*
Philadelphia	2.31	2.07	1.87	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	8.20
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1.25/1.50‡	1.10*k*	1.10*k*	.75*g*	.75*g*	8.00
San Francisco	....*u*	2.22	1.92	1.36	1.36	1.36	1.46	1.46	....	....	7.55
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 25c per. c. y. for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u*. Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 10c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS			PAVING ASPHALT (Per ton, less than 80 penetration)		ASPHALT BINDERS—FLUXES (Per gal., 80-300 penetration)		CUTBACK ASPHALT (Per ton)		ROAD OILS (Per gal.)	ASPHALT EMULSION (Quick-breaking) (Per gal.)	
	Granite per M. lots of 50,000 4x4x8 in.	Brick per M. 3x4x8½ in. carload lots	Wood per sq. yd. 3½ n. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.40*e*	$24.62*e*	$0.0787*e*	$0.1309*e*	$0.0826*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1384
Baltimore	150.00‡	48.00‡	80.00*m*	15.00	21.00	.06	.09	13.00	23.00	.065	.07	.14
Birmingham	.....	32.00*j*	...	17.95	.....†	.0747	.....†	.0834*h*	.....†	.065	.09	.....†
Boston	85.00	55.00	3.75	14.00	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.12‡
Chicago	150.00	55.00	2.20*d*	14.80	20.80	13.00*g*	18.50*g*	.0625*h*	.15*h*	.05*n*	.08	.12/.14
Cincinnati	112.00	37.50	....	16.40	.....	.085	.....	12.25	.....	.07	.085	.....
Cleveland	110.00	38.50	2.25	20.00	25.00	.09	.155	.10*h*	15.00	.07	.11	.15
Dallas	.....	36.00	....	13.25	20.30	.06	.11‡	16.00	24.80	.06	.05/.07	.07/.09
Denver	.....	27.50	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Detroit	.....	37.50	....	15.10*f*	22.60*f*	.0725	.1262	15.10	21.10	.067	.0725	.1262
Kansas City	.....	40.00	....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	.....	50.00	....	6.50*b*	15.00	6.50*bg*	15.00*bg*	5.50*b*	.....	.0192	.0525	.1125
Minneapolis	.....	.....	2.30*d*	.....	27.70	.....	.126	.....	32.64	.....	.....	.....
Montreal	.....	.....	....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
New Orleans	.....	.....	....	13.00*u*	19.00*u*	.055	.085	.06*h*	.09*h*	.....	.078	.....
New York	.....	.....	....	16.40	23.50*p*	.064	.124*p*	.07*h*	.13*hp*	.0675	.0725	.1225*p*
Philadelphia	130.00	58.00	4.06	14.00	.....	.055	.....	.065*h*	.....	.055	.065	.....
Pittsburgh	135.00	38.75	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis	.....	37.00	....	15.00*n*	21.00*n*	14.00*gn*	20.00*gn*	.065*hn*	.11*hn*	.05*n*	.09*n*	.8125*n*
San Francisco	.....	70.00	....	9.50	18.00	9.50*g*	18.00*g*	10.00	17.50	9.50*g*	.0525	.1125
Seattle	.....	60.00*c*	....	9.50*i*	18.00*i*	.....	19.00*gi*	10.00*i*	.....	9.50*i*	.0575*i*	.0675*i*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *m* Per thousand. † Available on priority only and quoted specially. *n* September price, none later available. *p* No steel drum shipments except to armed forces.

Electric Welding and TIREX CABLES

Welding, as a process, is very old but with the advent of electric welding new fields of usefulness were opened up. Along with the rapid development and steady improvement of electric welders there have been equally interesting and important changes in the power and electrode cables used with them. Cables for such service must have flexibility, they must resist abrasion and they must be economical in operation.

Among the first TIREX rubber-sheathed cables designed for special work were TIREX Welding Cables having conductors made up of thousands of small copper wires to obtain flexibility (#4 0 has 5341), a tough rubber sheath for resistance to abrasion and with every promise of unusual serviceability. Performance records have repeatedly shown TIREX Welding Cables to be unexcelled in every way for the work they were designed to do.

TIREX SELENIUM Rubber Armor — Unequalled for Long Life Toughness and Resistance to Abrasion

TIREX rubber-sheathed Welding Cables are subject to War Production Board restrictions governing the use of copper and rubber but even with necessary modifications they still are suitable for the rough-and-tumble work of welding and can be depended upon for excellent performance. While they are not available for purely commercial uses they should be specified and used by industries on essential war work having high priority.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

Simplex WIRES and CABLES

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ½-in. structural Base *d*	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	.....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	.....	.05	19.50	21.50	1.66	1.25	.1566	.....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	.....
Dallas	4.25	3.17	3.17	.....	.....	25.00	27.50	1.93	1.42	.1827	.....
Denver	4.35	3.95	3.85	.....	.....	26.50	28.50	1.97	1.45	.1863	.....
Detroit	3.65‡	2.52‡	2.52‡	.....	.10	23.00	25.00	1.68	1.26	.1584	2.66
Kansas City	4.00	2.64*cd*	2.64*cd*	.0	.05	19.60	23.60	1.78	1.33	.1683	2.89
Los Angeles	3.65*f*	2.84	2.69	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.80‡	2.75	2.75	.0	.10	25.00	27.00	1.80	1.34	.1701	2.75*d*
Montreal	4.00*i*	2.90*i*	2.80*i*	.....	.....	26.00*hij*	33.00*hij*	2.56*i*	3.14*i*	.268*i*	.....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1719	2.875
New York	3.75	2.76*c*	2.76*c*	.....	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.65	3.85	....	.....	....	19.50	21.50	1.71	1.28	.1611	2.74
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.69	2.75	2.75	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	.....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75*e*	2.50*e*	.....	.....	.....	34.50	38.50	1.93	1.42	.1827	2.95*ij*.

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August price; not on market.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
Atlanta	$49.66	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	55.40	.26	.463	2.07	5.85	140.00	.....	.70	....	64.1	56.1	61.6	53.1
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	57.1	43.4	54.0	39.6
Cleveland	54.75	.203	.3915	1.665	5.125	81.00	125.00	.30	1.60	67.8	59.8	65.3	56.8
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	61.56	.29†	.52†	2.16†	....	130.00	240.00	....	....	58.4	50.4	55.7	47.2
Detroit	54.75	.245	.4725	1.935	5.14	82.50	131.25	.35	1.50	57.7	44.0	54.8	40.6
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.8	46.3	46.0	59.7
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	59.6	51.6	57.0	48.6
Minneapolis	59.00	.275†	.495†	1.98†	5.14†	.....	.....	.90	2.10	64.2	56.2	60.7	52.2
Montreal	60.00	.85	1.50	5.25	8.50*e*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.40	2.10	62.4	54.4	58.8	50.3
New York	52.40	.455	.8775	2.925	7.65	.....	.....	.60	1.40	64.7	53.7	62.2	50.7
Philadelphia	51.00	.28	.54	2.30	6.75	150.00	225.00	.45	1.75	56.4	42.6	53.3	38.9
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	52.84	.28	.504	2.016	4.50	85.00	220.00	.90*j*	2.00*k*	56.4	42.6	52.5	38.1
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.50	192.50	.58	2.34	46.0	32.0	42.0	27.0
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included.

Get the JUMP on trouble!

KEEP 'EM PROPERLY SERVICED...

Trouble's ugly head will rear "as sure as shootin'" if your equipment is neglected. A machine run even one day longer than it should will be many times as expensive to repair . . . cost you plenty in lost production, too, and require considerably more critical material.

Keeping your equipment properly serviced will prolong its life, maintain production, cut depreciation and operating cost and increase your profits.

Close to you — as near as your phone — no matter where you are...is an Allis-Chalmers dealer, ready, fully-equipped to serve you. He will be glad to make frequent check-ups, tell you the exact condition of your outfits . . . let you know in advance what can be expected later. It's your guarantee against trouble! This is but one of the many valuable services offered to you by your Allis-Chalmers dealer. He is ready at all times to expertly handle your repair, rebuild or replacement work. His staff of skilled, factory-trained mechanics, using genuine parts, his knowledge and experience are always at your disposal. *Let him help you get the jump on trouble. Call your Allis-Chalmers dealer today!*

Factory-trained, Allis-Chalmers dealer service men, working under ideal shop facilities, using the right tools and parts, make short work of any repair, rebuild or overhaul job.

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TRACTOR DIVISION · MILWAUKEE · U. S. A.

THROW YOUR SCRAP INTO THE FIGHT!

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) — *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 R/A	6x12 R/A	12x12 R/A	2x12 R/A	12x12 R/A	3/8"	1/2"
Atlanta	$29.00	$28.00	$29.00	$27.00	$28.00	$29.50	$40.00	.....	.....	$60.00	$70.00	$17.90	$21.85
Baltimore	40.00	42.00	40.00	40.00	41.00	44.00	60.00	.....	.....	110.00	115.00	18.25	22.25
	45.00	*46.00*	*52.00*	*52.00*	*52.00*	*52.00*	*68.00*	*$72.00*	*$72.00*	.....	.....	.....	.....
Birmingham	34.50	34.50	32.00	32.00	32.00	34.00	53.00	53.00	56.00	.....	.....	17.35	21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	.....	.....	67.50	70.00	.....	.....
Boston ‡*	70.00[3]	70.00[3]	60.00[3]	60.00[3]	87.00[1]	100.00[1]	115.00[1]	.....	.....	125.00	150.00	18.25	22.25
‡*	*55.00*	*55.00*	*60.00*	*65.00*	*65.00*	*80.00*	*100.00*	*100.00*	*100.00*	.....	.....	.....	.....
Chicago	42.00	43.00	41.00	40.00	41.00	42.50	60.00	.....	.....	80.00	95.00	14.60	17.80
	46.00	*46.00*	*47.50*	*47.00*	*47.00*	*48.00*	*67.00*	*66.50*	*68.00*	.....	.....	.....	.....
Cincinnati	41.00	42.50	39.00	40.50	42.00	43.00	53.00	.....	.....	65.00	68.00	17.35	21.15
	.....	.....	.....	.....	.....	.....	*55.50*	*55.50*	*55.50*	.....	.....	.....	.....
Cleveland	42.50	43.50	41.50	43.50	45.00	47.00	53.00	57.00	57.00	90.00	93.00	17.75	21.60
Dallas *e*	39.50	40.50	39.50	38.00	38.50	39.50	53.00	53.00	53.00	78.00	83.00	14.60	17.80
Denver ‡	54.00[4]	52.00[4]	55.00[4]	55.00[4]	55.00[4]	56.00[4]	59.00[4]	*75.00*	*79.00*	.....	.....	10.45	12.70
Detroit	44.00	44.00	44.00	43.50	44.00	46.00	60.00	.....	.....	53.00	63.00	17.35	21.15
	.....	.....	.....	.....	.....	*51.50*	*55.00*	*60.00*	*60.00*	.....	.....	.....	.....
Kansas City	50.00	55.00	52.00	52.00	52.00	55.00	65.00	.....	.....	75.00	85.00	12.60	15.40
	50.00	*55.00*	*52.00*	*52.00*	*52.00*	*55.00*	*65.00*	*80.00*	*80.00*	.....	.....	.....	.....
Los Angeles *a*	*55.00*	*55.00*	*53.00*	*53.00*	*51.00*	*51.00*	*57.00*	*65.00*	*56.00*	.....	.....	9.90*gh*	12.05*gh*
Minneapolis ‡*b*	49.00[4]	49.00[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60	15.40
‡	*53.00*	*53.00*	*53.00*	*52.00*	*52.00*	*53.00*	*59.00*	*61.00*	*61.00*	.....	.....	.....	.....
Montreal †[7]	*43.00*	*46.00*	*42.00*	*45.00*	*47.00*	*54.00*	.....	.....	.....	200.00	200.00	.....	.....
	42.50	*42.50*	*45.25*	*47.25*	*48.25*	*46.75*	*50.75*	*50.75*	*50.75*	.....	.....	.....	.....
New Orleans	31.50	31.50	33.75	31.75	34.00	35.00	48.00	.....	.....	69.00	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	.....	.....	.....	.....	.....	.....
New York ‡	50.00	51.00	51.00	50.00	51.00	54.00	62.00	.....	.....	120.00*f*	125.00*f*	18.35	22.25
‡	.....	.....	*65.00i*	*65.00i*	*65.00i*	*65.00i*	[Range from $75 to $95]			.....	.....	.....	.....
Philadelphia	48.00	49.00	48.00	48.00	49.00	52.00	54.00	.....	.....	82.00	87.00	18.25	22.25
	54.00	*54.00*	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*75.00*	*75.00*	.....	.....	.....	.....
Pittsburgh	50.80	53.20	62.75	55.00	60.85	62.50	76.25	.....	.....	.....	.....	18.10	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis ‡*c*	50.00	50.00	48.00	47.00	48.00	51.00	65.50	*71.00*	*71.00*	83.00	70.00	14.60	17.80
San Francisco *d*	*35.50*	*35.50*	*37.00*	*37.00*	*36.50*	*36.50*	*40.50*	*49.50*	*49.50*	.....	.....	7.30*j*	8.90*j*
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	.....	.....	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. ‡ Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

NOTE: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ¾", $86.50; on ¾", $95.30; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness		EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
	A quality	B quality	
Atlanta	75%	75%	$0.15
Baltimore	78%	79%	.15
Birmingham	76%	76%	.105
Boston	77%	78%	.15
Chicago	77%	77%	.15
Cincinnati	77–10%	77–10%	.15
Cleveland	77%	77%	.19
Dallas	76%	76%	.1625
Denver	76%	76%	.155*e*
Detroit	77%	77%	.15
Kansas City	76–10%	76–10%	.155
Los Angeles	86%*d*	88%*d*	.1575
Minneapolis	77%	77%	.155
Montreal	40–5%‡	47%‡	.1675†
New Orleans	70%	75%	.16
New York	81%	82%	.22*f*
Philadelphia	78%	79%	.15
Pittsburgh	79%	79%	.1225
St. Louis	76–10%	76–10%	.155
San Francisco	66–15%	73–15%	.155
Seattle	75%	75%	.1575†

Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES — F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered from barge 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Short Leaf — Barge	Short Leaf — Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.23	$0.26
12 in.— 2 ft. from butt	6 in.	50 to 59 ft.	.26	.28
12 in.— 2 ft. from butt	6 in.	60 to 69 ft.	.31	.33
14 in.— 2 ft. from butt	6 in.	50 to 69 ft.	.28	.33
14 in.— 2 ft. from butt	6 in.	70 to 79 ft.	.31	.37
14 in.— 2 ft. from butt	5 in.	80 to 85 ft.	.40	.48
14 in.— 2 ft. from butt	5 in.	85 to 89 ft.	.45	.53

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.50*a*
New York	S. L. Sap Pine	1.43	1.54	2.59	1.76 2.86
	Mixed Oak	1.71	2.59	2.20	3.25
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
	Southern Pine	....	....	....	....
Chicago	Red Oak	....	2.40*a*	....	3.00*a*
	Southern Pine	....	....	....	....
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*a*	....	3.25*a*
St. Louis	White Oak	1.65*	....	1.90*	....
	Red Oak	1.55*	2.15*a**	1.90*	2.70*a**
	Sap Pine or Cypress	1.35*	....	1.70*	....
San Francisco	Douglas Fir	1.15*bef*	....	....	3.00*eaf*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6" x 8 x 8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F. o. b. cars. † Out of market. * September price, none later available.

CHEMICALS

Water, sewage treatment road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.25– 3.10
Chlorine cylinders, liquid, per lb. delivered	.0525
Calcium chloride, 77–80%, flaked, in 100-lb. paper bags, delivered, per ton	18.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb	5.15– 5.50

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity. Common backing	Straight hard	LIME Per ton. Hydrated finishing	In paper. Common hydrated	Carload lot, Pulverized or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	15.00k	19.00k	18.00	13.00	2.50m
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25lo
Boston	89.35a	93.30a	178.70a	202.50	271.80	308.20	16.50i	19.50i	17.50†	12.50†	14.92†
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	17.50	17.50	15.50	13.00	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	14.50j	13.25j	3.00jm
Dallas	62.50	67.00	135.00	162.00	212.50	263.00	13.50i	15.00i	19.00	15.00	.95n
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	17.00	25.00j	17.00j	20.00j
Detroit	76.90	81.50	152.80	201.00	262.00	310.00e	17.50	18.00	16.60	14.90	14.60
Kansas City	67.00	69.00	89.00c	128.00	163.00	189.00	15.00	16.00	19.32	13.00	10.92
Los Angeles	73.50†r	89.50†r	128.00c†r	210.00†r	368.00†r	460.00†r	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.00b	86.40b	146.90b	.....	177.00b	246.00b	13.60	15.60g	21.00	16.00	19.00
Montreal	99.10a	105.65a	154.75a	104.65af	154.75au	155.25	22.00†u	27.25†u	24.60u	18.00u	13.00u
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00c	193.30h	238.80h	295.60h	15.00	.....	20.00	14.00	17.00
Philadelphia	90.00	97.70	183.20	197.10	243.20	301.10	17.00	20.00	15.50	8.55	10.55
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55m
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	18.00
San Francisco	84.00	94.50	225.00	.....	.....	.....	17.50	22.00	20.00	20.00	16.40
Seattle	115.00	125.00	230.00	.....	.....	.....	20.00f	21.00f	20.00s	20.00s	20.00s

† F.o.b. a Smooth. b Carload lots delivered to job. c 6x12x12 in. d Not load bearing. e 48 lb. tile. f Less $1.00, ½ cash 15 days, balance 30 days. g Selected common. h F.o.b. Perth Amboy, N. J. i F.o.b. Warehouse only. j LCL. k $1.00 discount if paid in 10 days. l Lump. m Per bbl., 180 lb. n Per sack 100 lb. o Per bbl., 200 lb. p 280 lb. bag. r 5% discount 10 days. s 2% discount for cash. t 5½x8x12. u Plus 8% sales tax.

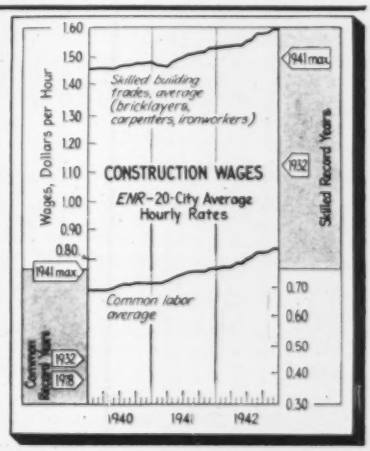
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry a	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum b	Ferric Oxide d	ROOFING SUPPLIES Carload Lots f.o.b. factory Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50r	1.98r	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.55	....	2.25	2.12‡	1.72h‡	1.72h‡	.50‡	20.00‡
Chicago	10.00	13.75	....	....	....	1.75hf	1.66hf	1.82hf	.33f	23.00f
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39h	2.39h	.36	21.00
Cleveland	10.00	13.75	2.10	4.80	1.95	1.93	1.83h	1.83h	.35	29.00
Dallas	10.00	14.50	1.88	2.11n	.05l	1.75h	1.66h	1.66h	.35	39.00
Denver	10.50	14.25	1.65	....	.27l	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.40	2.50	2.50	.35	22.00
Kansas City	10.00	13.875	2.39g	2.55gr	2.16gn	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75i	1.66hi	1.66hi	.32	23.00
Montreal	9.25	6.25	2.85p	4.70p	2.70p	2.85	2.58	2.07	.63	1.85k
New York	10.00	13.75	2.03	....r	1.64	1.66	1.58h	1.58h	.26	25.00
Philadelphia	10.00	13.75	....	....	....	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.03	1.95	.80	1.95	1.94h	1.94h	.34	26.00
St. Louis	10.00	13.75	2.28	2.89	1.96	1.91	1.66	1.66	.28	23.00
San Francisco	10.25	14.00	1.80	2.75n	1.35/2.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16h	....	.35	26.50j

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. a Red lead prices change frequently due to pig lead price changes. b U. S. War Dept. Spec. 3-49A. c ASTM Spec. D266-31. d 80% minimum ferric oxide. e Subject to 25% discount. f Distributors' price to contractors. g 5 gal. can. h Per roll, 65 lb. i Minneapolis and vicinity. j Asphalt pitch. k Per 100 lb. l Per lb. m Per bbl. n May, 1941 price, no later quotation available. p Plus 8% sales tax. r Not available, except on priority rating; then quoted specially.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.375	$1.00	$1.375	$1.00/1.25	$1.25	$0.40	$0.50
Baltimore	1.625	1.375	1.80	1.625/1.80	1.50	.70	.70
Birmingham	1.75	1.125/1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.625	1.40/1.55	1.625	.80	.80
Cleveland	1.75	1.50	1.75	1.75	1.75	1.00	1.00
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65b	1.50b	1.625b	1.43b	1.51b	.80b	.80b
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.55
Los Angeles	1.50	1.50	1.50	1.50	1.667	.75	.75
Minneapolis	1.50	1.375	1.50	1.40	1.50e	.925	.925
New Orleans	1.50	1.25	1.50	1.375	1.375	.65	.65
New York	2.00b	1.85b*	2.00	2.00b	2.00c	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.50	1.75	1.5625/1.625	1.75	.80	.70
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875c	1.4375	1.75	1.50	1.75c	.95	.95
Seattle	1.715	1.415	1.615	1.565	1.715	1.015	1.10
Montreal	.965	.855	.90	.80	.945	.505	.505



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.599
ENR Common Average: $0.834

b 7 hr. day. c 6 hr. day. d 35 hr. wk. e 30 hr. wk. *Negotiating now for increased rate.

Official Navy Photo

"Jap Slappers!"

NAVY MEN CALL THEM "P. T. BOATS"

Small, light and with an amazing amount of speed, the famed "P. T. Boats" can outmaneuver any destroyer, cruiser or battleship the enemy has ever built. They carry a death sting in their fore and aft torpedo tubes. And for their splendid accomplishments as fighting crafts, they are the pride and joy of the Allied naval men the world over. Their worth has been admirably proven on the field of action.

Layne Pumps and Well Water Systems bear an amazing similarity to the P. T. Boats, on the points of sturdiness. First in genuine quality and second, in that they, too, have proven their worth on the field of action. These Water Systems have been designed and are being built to fulfill a tremendously important task—that of providing millions and millions of gallons of water under any and all conditions. Throughout the Nation, the name Layne is as famed in the water producing field as is the name of P. T. Boats in Naval warfare.

Hundreds and hundreds of Layne Well Water Systems are now serving army camps, naval stations, ship yards, flying fields and munitions plants. Their quality is worthy of outstanding recognition. For late catalogs, bulletins, etc., address

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PUMPS & WELL
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Louisiana Well Company.....Monroe, La.
Layne-New York Company.....New York City
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd. London, Ont.

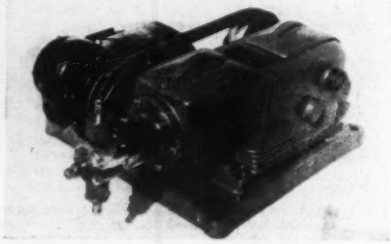
WORLD'S LARGEST WATER DEVELOPERS

New Aids to the Constructor

Equipment and material announcements and manufacturers' news

High-Pressure Feeder

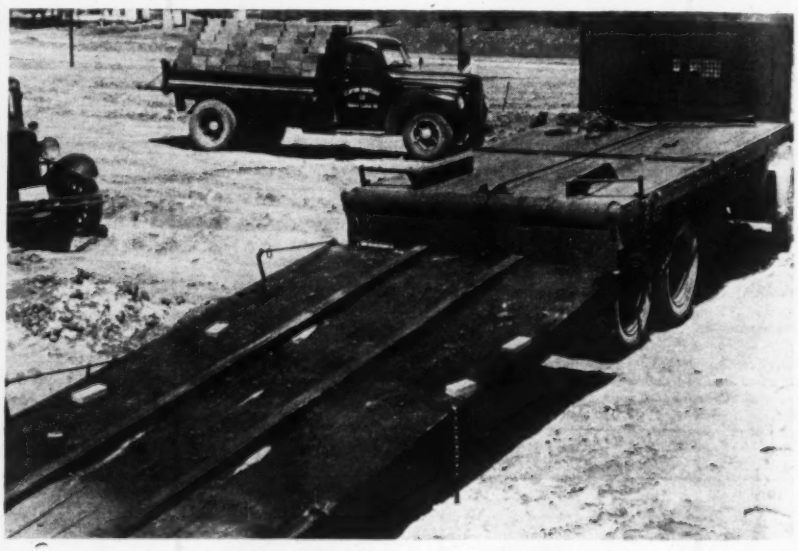
The High-pressure Midget Chem-O-Feeder, illustrated here, is one of Proportioneers 1942 accomplishments. The machine is placed on a substantial base, its stroke adjusting mechanism is under



dustproof cover, and its substantial frame permits use of this small unit for injecting into pressures almost up to 200 lb. per sq.in. Also included is the exclusive fluid-sealed yoke directly behind the reagent cylinder. This is a patented pump innovation said to be of considerable import, since it enables the user to place a neutral oil, water or any fluid in the yoke under the removable cover behind the reagent cylinder, which permits the plunger to operate submerged at all times.—*Proportioneers, Inc., 9 Codding St., Providence, R. I.*

Rubber spring

A rubber spring for autos has now been perfected and is in use on certain U. S. amphibian combat vehicles, according to J. D. Beebe, of the B. F. Goodrich Co. He explained that the torsional rubber spring was simply a steel cylinder and shaft, with the space between cylinder wall and shaft filled with rubber. Either the shaft or cylinder is held in fixed position, and the other member connected to the wheels by arms, with all the springing accom-



Big One Out of Little One

The Truckstell method of rebuilding new and used 1½-ton trucks into larger units is exemplified in the photographs above showing a converted truck which was further expanded in usefulness. Specially designed skids, with full load of lumber, can be loaded on the truck or unloaded in a few minutes, by means of a winch and ingenious rollers. Empty skids are simply slid off the truck to the ground. Skids can be placed at various stations for loading while other skids with full loads can be delivered and lowered to the ground as a unit to be unloaded by workmen when convenient. This equipment provides an efficient shuttle service that permits handling lumber much faster than anything heretofore available. By rebuilding new and used 1½-ton trucks into units rated at 3½ to 6 tons capacity as trucks, and up to 50,000 lb. as tractors, thousands of man hours and vast quantities of metal are conserved, the manufacturers claim. Furthermore the increased capacity of the expanded truck will permit one driver and one truck to haul two or three times as much payload as two or three drivers with the same number of smaller standard trucks. —*Truckstell, Inc., Cleveland, Ohio.*

plished simply by the twisting movement in the rubber. Test passenger autos, he said, have run more than 70,000 miles on such springs without even needing adjustment.—*The B. F. Goodrich Co., Akron, Ohio.*

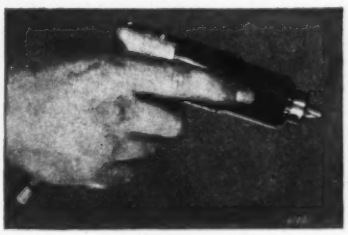
Special Purpose Pencil

To make clear and legible multiple carbon copies is the sole purpose of a newly introduced pencil made by Reliance Pencil Corp. Known as 700 Duro lead manifold carbon copy pencil, this

black-graphite pencil is soft enough to be legible on the top sheet, without cutting through the original, is said to be easy to erase with, and strong enough to withstand necessary pressure for copying work. The manufacturer claims it makes clear, legible impressions through five or six carbons; does not smudge from moist hands. The pencil comes in three lead degrees, medium, firm and hard—the latter for a large number of carbons. —*Reliance Pencil Corp., Mount Vernon, N. Y.*

Lightweight Drill

A new lightweight pneumatic drill manufactured by Ingersoll-Rand Co. is finding wide application. Identified as Size 00A drill, it weigh less than 2 lb. Powered by a "Multi-Vane" air motor, the drill is sturdily constructed for three-



shift endurance. A built-in speed regulator can be set for desired performance, and split-second throttle action permits quick, accurate hole-starting. Lubrication is provided by a built-in automatic oiler. Because of its light weight and "fit-the-hand" pistol grip, the manufacturer says the drill can be used for many hours without fatigue.—*Ingersoll-Rand Co., 11 Broadway, New York, N. Y.*

Sweeping compound

A sweeping compound, product of the Philip Carey Mfg. Co., is said to be noncombustible, chemically stable, shows no tendency to heat spontaneously, and does not evolve flammable vapors.

An asbestos product, the sweeping

This WOOD SPEEDS OUTPUT by Reducing Plant Maintenance

TEXTILE MILLS, like other manufacturers of badly needed materials for war, have a double task today—producing those materials and keeping their plants in condition to meet this demand. Wolmanized Lumber* makes this task easier.

DYE HOUSES, for example, are dripping wet much of the time. Wood construction offers many advantages here, but it must be wood that is able to withstand these high humidities. Because Wolmanized Lumber is that kind of wood, the mills using it are able to get along with far less maintenance. Valuable workers are available for production.

MILLIONS OF FEET of Wolmanized Lumber have been installed by the textile industry since they started using it eighteen years ago, for roof planks and timbers, flooring, doors and windows. Outstanding performance of this long-lived lumber under conditions conducive to decay long ago proved its worth.

WOLMANIZED LUMBER is able to resist decay and termite attack because it is deeply impregnated by the vacuum-pressure process with a proved preservative. In employing Wolmanized Lumber, you retain all of the usual advantages of working with wood: ease and speed of erection, lightness with strength and resilience. It is clean, odorless and paintable. American Lumber & Treating Company, 1649 McCormick Building, Chicago, Ill.

*Registered Trade Mark

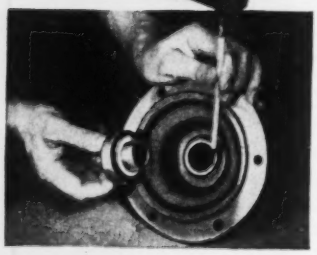
WOLMANIZED LUMBER

WOLMANIZED

CARVER PUMPS are making enviable records on thousands of tough pumping jobs today because their performance *stays* high. The answer lies in Carver's *Lifetime* Seal—a correctly engineered seal with wearing surfaces of tungsten carbide, the hardest, longest-wearing material available!

If *your* job calls for a pump that will stand the gaff of thousands of hours pumping dirty, muddy or sandy water and still retain its original lightning-fast prime, its original high efficiency, a Carver is the *only* pump for you!

Write or wire today for complete information — the Carver line includes capacities from 5,000 to 125,000 GPM in gas engine, electric motor or belt-driven models.



ABOVE: Here's the vital heart of sustained high performance — the seal that keeps air out and water in. Fast priming and high efficiency suffer with the slightest leak — that's why Carver builds a *Lifetime* Seal for long-lasting performance!

BELOW: Wearing surfaces on the Carver Lifetime Seal are Tungsten Carbide — so hard it cuts glass!

CARVER PUMP CO.
Muscatine • Iowa

DEALERS WANTED

Carver's complete pump line is available to aggressive dealers in several U. S. territories. Ample plant capacity assures prompt service; full support with extensive advertising and sales helps offered. Write or wire for details of Carver dealership plan.

CARVER CENTRIFUGAL Certified PUMPS

compound is said to efficiently remove deposits of oil and grease from floors, eliminating fire hazards, and having no acid or caustic ingredients it will not damage the floor or injure the user or his clothing.—*The Philip Carey Mfg. Co., Lockland, Cincinnati, Ohio.*

Cleaner

The Moto-Mower Co. has announced the adpatation of a tractor to a third purpose—that of factory sweeping. The manufacturer claims the new tool is the equal of a crew of sweepers on a production, construction or other job. The

equipment is said to be easy to operate, turning right or left under its own power, by means of a separate clutch on each wheel of the tractor, controlled at the handlebar. Heavy metal machinings are as easily picked up as lighter dust and dirt. Other innovations include a spray that can be adjusted so that it lays the dust but doesn't wet the floor, and a heavy bumper for the larger models.—*Moto-Mower Co., 4600 Woodward Ave., Detroit, Mich.*

New Insulating Material

A new insulating material for use in the construction of cold storage facilities has been developed by the Celotex Corporation of Chicago to take the place of cork from Spain. This material, known as "Celo-block," is made of laminated cane fiber.

Celo-block is manufactured from the fibers of Louisiana sugar cane. It has a conductivity of 0.30 Btu. per inch, per square foot, per hour, per degree Fahrenheit. It is made by weaving and felting cane fibers into ½-in. boards, which in turn are laminated into various thicknesses using asphalt as the binder and for surface protection. The individual fibers are sterilized, waterproofed and protected from dry-rot and fungus growth by a patented process.

The new material has been used by

WHERE SPACE IS LIMITED

MULTI-BREAKER DISTRIBUTION PANEL
Type MH—230 Volts A. C. (or less) 1, 2 and 3 pole branches, 15-100 amp.

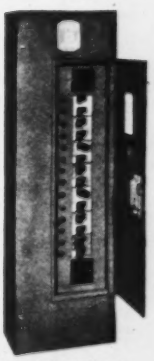
SQUARE D Column-type PANELBOARDS

Mounting space for electric lighting and power distribution panelboards in modern industrial plants is often limited to H-beams, supporting pillars or narrow wall separations between windows. These are ideal applications for Square D streamlined column-type panelboards.

These panelboards are narrow—as little as 7¼" width in the Multi-breaker lighting panelboards. They will fit into spaces which cannot accommodate standard type panels. Available with circuit breakers, Multi-breaker branches, or with fusible circuits—plug or cartridge. All of them carry the Underwriters' approval.

A Square D sales engineer will be glad to help you in selecting the type best adapted to any particular job.

CIRCUIT BREAKER LIGHTING PANEL
Type NA1B—125-250 Volts A. C.-D. C. 1, 2 & 3 pole branches 15-50 amp.



MULTI-BREAKER LIGHTING PANELS
Type NMM—115-230 Volts A.C. 1 & 2 pole branches, 15-50 amp.

FUSIBLE LIGHTING PANELBOARDS
Type NRTC—125-250 Volt A.C.-D.C. 1 & 2 pole branches, 30 amp., plug or cartridge fuses.

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SQUARE D COMPANY
DETROIT - MILWAUKEE - LOS ANGELES
KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK
IN CANADA: SQUARE D COMPANY (CANADA) LIMITED, TORONTO, ONTARIO

Best Fed Fighters IN THE WORLD

To keep our fighters "the best fed", our armed forces use the most modern mechanized kitchen equipment available. Here again Briggs & Stratton Motors are proving their value by furnishing dependable power for bread mixers, refrigerators, water supply, lighting plants and other gasoline-powered equipment.

Today, the entire facilities of the Briggs & Stratton Corp., are devoted to the war effort and approved civilian uses. Therefore, Briggs & Stratton, 4-cycle air-cooled motors, now in essential service, should be given every care to assure uninterrupted performance.

Most important in maintenance is the use of clean fuel, correct lubrication with the right grade of oil, changed at recommended intervals, and motor kept clean and properly adjusted. In any case of emergency, your dealer or nearest Briggs & Stratton Service Station will be glad to be of assistance.

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MILWAUKEE, WISCONSIN, U. S. A.

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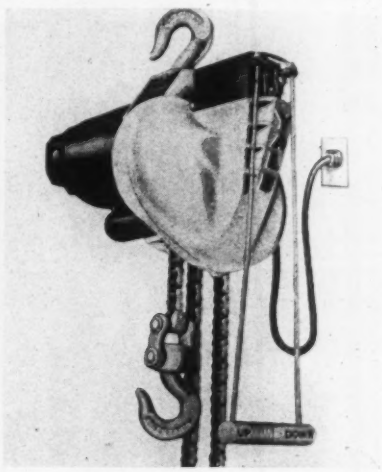
Buy U.S. War Bonds

4 CYCLE
BRIGGS & STRATTON
GASOLINE MOTORS

the Army and Navy for the construction of seven training centers, base and air fields. At one naval training station, 650,000 board feet of 2-in. and 3-in. Celo-block were used in construction of storage rooms for fresh meat and other perishables.

Midget Hoist

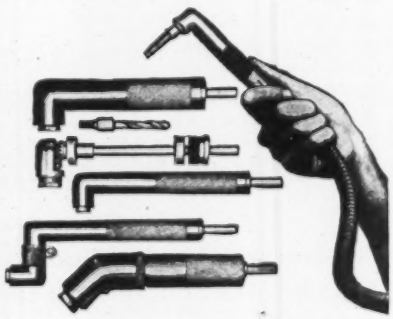
The midget electric hoist, said to be mechanically perfect in design and overall efficiency, is one of the results of the Yale & Towne Mfg. Co.'s efforts to create new production methods and better and



more versatile tools. The hoist is made to lift capacity loads from ⅛ to 1 ton, and is tested to 50 percent of overload before it leaves the factory. The manufacturer says the cost of operating the Midget King is very economical, and the unit is made for both a-c and d-c current use. The hoist requires no extra equipment, and can be installed without elaborate fittings.—*Yale & Towne Mfg. Co., Philadelphia, Pa.*

Small Size Drill Heads

Wyzenbeek & Staff, Inc., manufacturers of Wyco flexible shafts and power tools, has announced a new line of "junior" size angle drilling heads, designed for

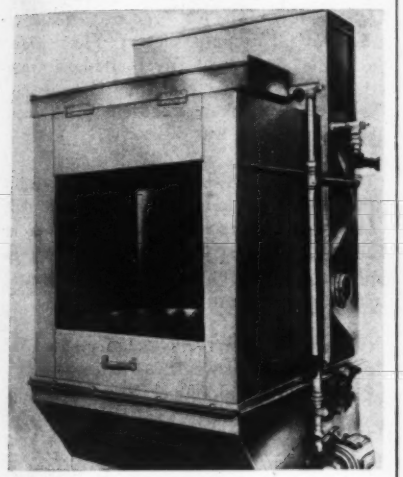


production drilling, countersinking, etc., in close quarters. These new angle heads are used on a flexible shaft or flexible shaft extension of a portable electric

drill. They come with 90 deg., 45 deg., and 30 deg. or universal heads, have overall diameters of ½ in. or ¾ in., and are adaptable for many uses.—*Wyzenbeek & Staff, Inc., 836 W. Hubbard St., Chicago, Ill.*

Paint Spray Booth

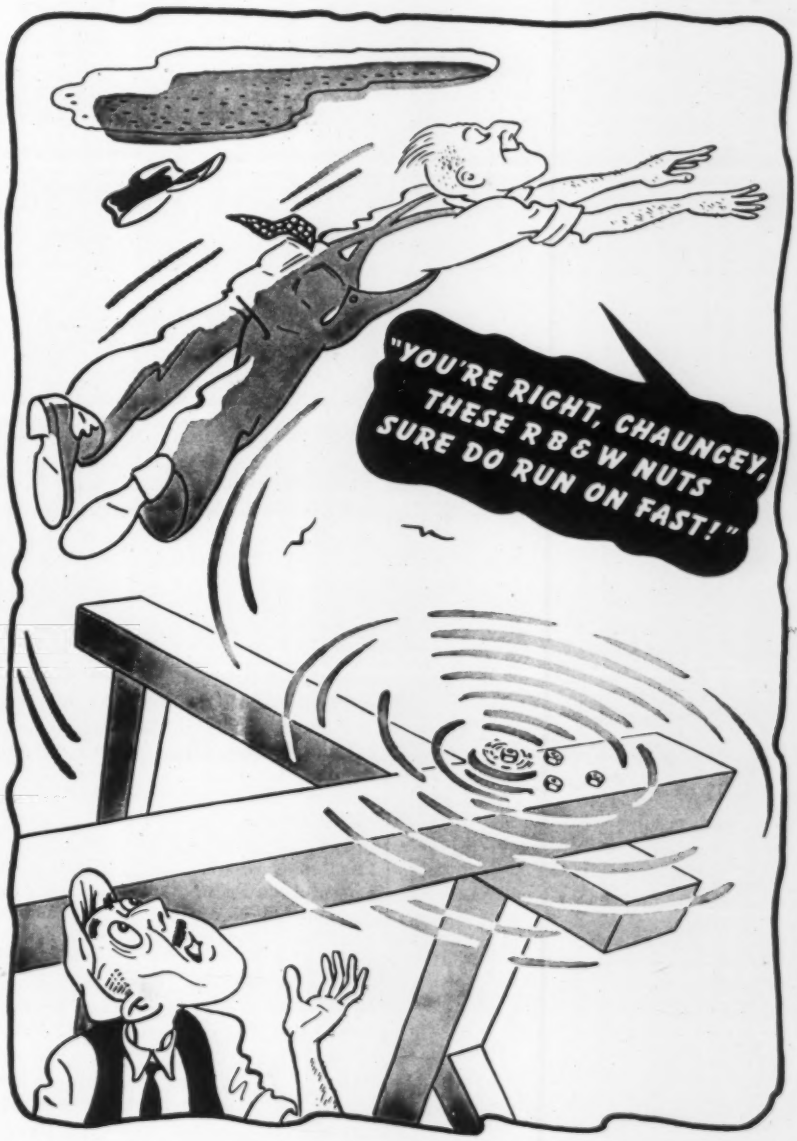
A single compartment of the Aqua-Restor paint spray booth, featuring rear and side water-impingement walls, is shown above. Through continuous and effectively pressured flow, the water-



washed walls provide unusual efficiency in spraying operations of all sizes and types. The makers claim that the absence of spray nozzles eliminates the possibility of clogging; only low horsepower pumps are required. Employee health protection is said to be assured, and fire hazards reduced to a minimum. Little servicing is necessary, due to the complete elimination of moving parts.—*Aqua-Restor Division, Mayer Mfg. Corp., 45 Division Place, Brooklyn, N. Y.*

New Metal

A new metal has been added to the line of plated metals produced by the American Nickeloid Co. The new metal—electroplated zinc on steel—is said to be a satisfactory substitute for pure nickel, tin, chromium, aluminum or stainless steel. Zinc plated steel is steel, which is electroplated with a coating of zinc. The zinc provides protection to the base metal. The new metal is supplied in uniformly prefinished flat sheets that eliminate the slow and costly plating of small parts after fabrication. It is furnished at present in sheets only, in sizes up to 36x96 in. in a full range of gages and tempers, in polished, unpolished and satin finishes.—*American Nickeloid Co., Peru, Ill.*



Use R B & W Bolts and Nuts . . .

Quick-starting, quick-tightening because they are accurately, uniformly sized and threaded — and carefully inspected.

Vibration-resisting, shock-resisting because the manufacturing method insures extra strength, and all processing is controlled from raw rod to finished product.

EMPIRE

AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

RB&W *Making strong the things that make America strong*

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.
Sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle

. . GET A FAST START . . . .
Drive Those Piles Down in Quickest Time

. . . . **Do It NOW!**

In planning for building erection or Naval Dry Docks, Bomber Plants, Navy Warehouses, Marine Corps Barracks, Power Plants, Bridges, or other Victory construction, find out VULCAN advantages immediately. Types for every job—each offers simplest fastest, lowest cost way of driving down piles. Write for bulletins.

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago Illinois

Manufacturer's Activities

Personnel changes and new plans

JOHN L. COLLYER, president of the B. F. GOODRICH CO., is shown here as he received the Joint Army-Navy "E" award on behalf of his company and its employees. Speakers at the ceremony, held recently at the company's Akron, Ohio, plant included BRIG. GEN. RAYMOND F. FOWLER, chief of the supply division of the Corps of Engineers. GEORGE BASS, president of Local No. 5, United Rubber Workers of America, accepted the award for the company and its workers.

THE GREGG CO., eastern sales representative of the RUSTA RESTOR CORP., has announced that the PUBLIC WORKS SUPPLY CO., of Lynn, Mass., is now representing it in the sale of Rusta Restor cathodic tank protection equipment in the New England states.

EDMUND N. BOSWELL, 61, general manager of ALCO PRODUCTS, INC., of Dunkirk, N. Y., died November 20 at Emporia, Va.

REAVES E. STROBEL, formerly manager of the New York Office for the YOUNGSTOWN MILLER CO. has been transferred to the factory at Sandusky, Ohio, in charge of sales. Other company changes include: R. ELLIOTT SULLIVAN who has joined the sales staff to handle Pacific Coast territory with headquarters at Carlsbad, Calif.; S. C. CUTLER, formerly Florida representative, has been transferred to Washington, D. C.

ERNEST E. TROSS, former Youngstown, Ohio, industrialist, is leaving his post with the FEDERAL MACHINE & WELDER CO. of Warren, Ohio, to become an executive of the PACKAGE MACHINERY CORP. in California.

RUSSEL L. WHITNEY has been appointed sales manager of the WESTINGHOUSE ELECTRIC CO.'s transformer division at Sharon, Pa. A. C. FARMER, formerly assistant sales manager, has been named assistant to the vice president, and A. P. BENDER, former sales manager, has been made assistant sales manager to afford the best opportunity for his complete recovery from a long illness.

JOHN J. KLEIN, assistant secretary of the MARMON-HARRINGTON CO., died recently.

R. S. PATTEN, general manager of the PATTEN TRACTOR AND EQUIPMENT CO., of Chicago, Ill. has been appointed a member of the Associated Equipment Distributors Board of Directors, succeeding his brother B. C. Patten, who resigned recently.

Employees of the HOMESTEAD VALVE MANUFACTURING CO. recently received the "M" Pennant, Victory Fleet Flag, and the Award of Merit Badges from the United States Maritime Commission as a mark of their excellent production record for the war agency.

The WATSON-STANDARD CO., Pittsburgh, Pa., recently announced the appointment of H. A. ERICKSON as sales engineer in charge of industrial technical service in northwestern Pennsylvania and central and western New York.

GEORGE M. VERITY, 77, chairman of the board of the AMERICAN ROLLING MILL CO., died at Middleton, Ohio, recently.

With a record of no loss of man hour time due to accidents for four consecutive years in its North Kansas City, Mo. paper mill, the UNITED STATES GYPSUM CO. has been awarded the Edward Benton Fritz Memorial Trophy as the major award in the paper industry annual safety contest. In addition, a plaque has also been awarded this plant by the National Safety Council.

The board of directors of the WICKWIRE SPENCER STEEL CO. has announced that PHILIP M. MORGAN, president of the Morgan Construction Co. of Worcester, Mass. and DAVID G. BAIRD, vice president of Marsh & McLennen, New York City, have been elected members of the board.

BRUCE GREGORY, formerly in charge of sales for the THORNTON TANDEM COMPANY of Detroit, has been made a vice president in charge of sales and a member of the board of directors. Well known in the automotive industry, Mr. Gregory is a graduate of the University of Michigan and was with the sales department of the FIRESTONE TIRE & RUBBER CO. for two and one-half years, and with the GENERAL TIRE CO. before joining Thornton Tandem.

CALLING ALL CONTRACTORS AND OPERATORS!

Enlist

TO CONSERVE CONSTRUCTION EQUIPMENT

Show others that you are helping to make your equipment last longer and work faster. Regardless of the type or make of your equipment, if you will sign and mail the pledge form below, we will send you a colorful red, white and blue emblem to put on your machine (or it can be used on a truck or passenger car). Then it's up to you to practise what you have pledged—it's one big way you can contribute to victory.

Get This Emblem Sign This Pledge

New Emergency "FIX-IT" HANDBOOK for LORAIN OWNERS

To assist our customers in keeping their machines in operation, we have just prepared a 24-page handbook of suggestions and ideas on how emergency repairs may best be accomplished. Indicate on the pledge form if you want us to send you a copy.

THE THEW SHOVEL COMPANY, *Lorain, Ohio*

I hereby pledge that I shall do all in my power to prolong the life of any construction equipment in my ownership or care regardless of type or make.

I realize that it is my responsibility to avoid time-consuming delays caused by mechanical breakdowns and will see that frequent inspections are made and that necessary adjustments and repairs are promptly taken care of.

I will avoid waste of parts and materials and will eliminate any abuse of my equipment due to non-recommended operation.

Signed _____

Street Address _____

City _____ State _____

"FIX-IT" Handbook Wanted _____

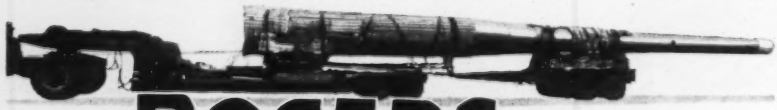
Lorain Model No. _____ Serial No. _____

THEW CENTER DRIVE

Tanks move doggedly forward wreaking havoc on the enemy but their speed is necessarily slower than trucks and their span of continuous service considerably more limited.

So they crawl up on Rogers Trailers and are moved quickly to the line of combat—or from it when repairs or reconditioning becomes necessary.

Thus, the effectiveness of an important combat unit is increased manifoldly by these non-combat vehicles.



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LOW BED-
-HEAVY DUTY
TRAILERS

ROGERS BROTHERS CORP., ALBION, PENNA.

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THE WORLD'S LARGEST MAKERS OF LIQUID METERS
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"GUNITE"

can reduce your construction costs. It is efficient and dependable, an established product.
WE RECOMMEND "GUNITE" for structural steel protection, floor and roof slabs, thin exterior walls, partitions, tanks, reservoirs, restoring disintegrated concrete surfaces, repairing reinforced concrete, etc. Let us suggest how "Gunite" can best solve your problems.

PRESSURE CONCRETE CO.
"GUNITE" CONTRACTORS
6 Avenue B Newark, N. J.

The TURNER BRASS WORKS has [illegible] produced a very attractive two-co[illegible]wall chart entitled "Know Your Blow[illegible]rch." This chart, designed for use in[illegible]r industry and defense training [illegible]chools, shows how all parts of the blow torch are labeled and gives lighting instructions and safety hints.

War-conscious GENERAL ELECTRIC workers have shattered all company records for worth-while suggestions, WILLIAM E. OWEN, head of the company's suggestion system announced. During the first ten months of 1942, the G-E employees were paid $115,000 for 12,250 ideas for saving materials or time in war production.

CLARK & GIBBY, INC., manufacturers of office furniture, recently celebrated its 34th anniversary.

BENNET B. BRISTOL, who with his brother Edgar H. Bristol, who founded the INDUSTRIAL INSTRUMENT CO. which later became the Foxboro Company, died at Falmouth Heights, Mass. recently.

A record of sustained production for 18 consecutive months was rewarded recently by the U. S. Navy with presentation of its first two-star burgee in the automotive industry. Coincident with the award, the Navy revealed that the FISHER BODY division of GENERAL MOTORS CORP. —which was the recipient—has been given an expansion and extension of the Naval ordnance contract upon which the plant is working.

Announcement has been made by The CURRAN CORPORATION of Malden, Mass. of the opening of a new war products development laboratory, to be located in Prospect Mills, Lawrence, Mass. It is said that the purpose of the Laboratory is to put its creative chemists on the development of both offensive and defensive war chemicals.

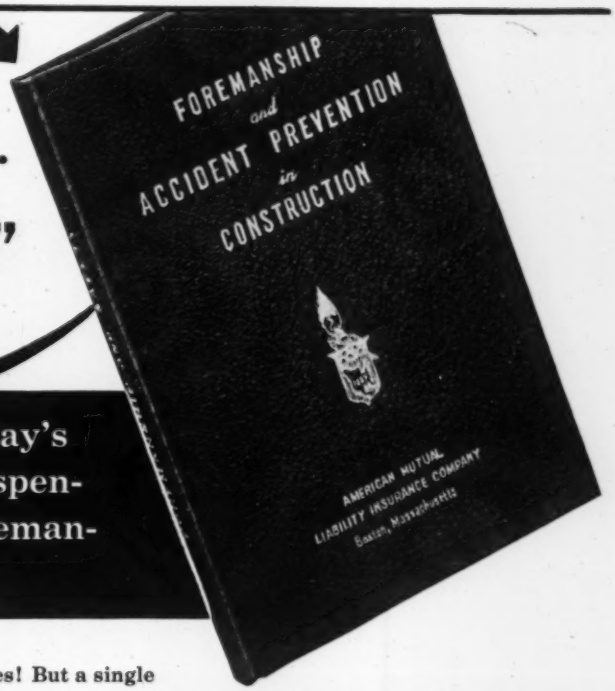
The TEXAS GULF SULPHUR CO. recently received the Army-Navy "E" flag for outstanding accomplishments in the production of war materials. More than four thousand employees of the firm and their guests heard the company's achievements lauded in speeches by BRIG. GEN. RAY L. AVERY, Commanding officer, Edgewood Arsenal, and other officials.

HARLOW BRADLEY, 50, supervisor of foreign dealers for the ALLIS-CHALMERS MANUFACTURING CO. of Minneapolis, since April, 1941, died recently in New York City.

One of the oldest of New England's manufacturing plants, converted to wartime operation for the production of marine equipment, the WHITIN MACHINE

A BOOK ABOUT LEADERS, FOR LEADERS...

"FOREMANSHIP"



Concise, Factual Answers to Today's Most Vital Questions—Your Indispensable Guide to Problems of Foremanship In Construction.

How to SELECT good foremen

Here is a clear, complete outline of all the responsibilities of a foreman, plus the qualities of mind and character that make for successful foremanship — at a time when good foremen are hard to find.

How to TRAIN foremen

Here, too, is a practical basis for classroom or group discussion, immediately usable in your training program. Yet it is based on such a thorough knowledge of construction problems that even your most experienced men will profit from it.

How to IMPROVE your foremanship

If you are a foreman, a book like this, written by men with first-hand knowledge of construction foremanship, is filled with practical suggestions that will simplify and improve your work.

Green men, *hurried* men, and in some cases *fewer* men, create problems of safety, efficiency and economy which this book will help you solve.

Written by practical men like yourself — now American Mutual engineers — it is offered as a free service to our policyholders, in the proven belief that safety and good foremanship go hand in hand.

Look over the Table of Contents with your present personnel and accident problems in mind. Then decide — now — to attach the coupon below to your letterhead and obtain your free copy while the supply lasts!

Only 62 pages! But a single sentence may save you days of worry and delay!

Chapter I

Foremanship — the foreman's responsibility to his job, to the superintendent, to his men, to his fellow foremen, to subcontractors and the general public; qualities which make for successful foremen.....7

Chapter II

The Foreman's Place in Accident Prevention — planning for accident prevention; accident investigation; developing the accident prevention program.....15

Chapter III

The Foreman and His Men — selection and hiring, placing and training, supervisory methods.....23

Chapter IV

Job Planning — in relation to long range planning, layout of the job, receipt of materials, day-to-day plan.....33

Chapter V

Physical Protection — excavation, staging and scaffolding, runways and platforms, barricades, overhead protection, clothing 41

Chapter VI

Care, Use and Storage of Equipment — principles of selection, testing and inspection; rigging, hand tools, supports, derricks, scaffolds, safe practice rules, machine operators, trucks, cranes, moving equipment, moving material, air equipment, machine guards, yard storage, tool storage 51

Other American Mutual Aids to Profitable Operations

Regular cash dividends which have always saved 20% or more of insurance costs (a big item in your operating costs).

Safety recommendations which have lowered many policyholders' rates well below average — as well as helping to avoid the delays and trouble that accidents cause.

Prompt service on claims and injuries wherever your contract may take you.

Modern, comprehensive coverage fitting your special needs for workmen's compensation, contractors' public liability, fire, automobile, fidelity bonds and other forms of casualty insurance written by American Mutual and affiliates.

Admitted Assets	$47,908,092.19
Liabilities	40,659,020.90
Surplus to Policyholders	7,249,071.29

As of December 31, 1941

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AMERICAN MUTUAL
WORKS FOR YOUR SAFETY

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Dept. O-17, 142 Berkeley St., Boston, Mass.

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Name.....

Company.....

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Air Bases and Military Highways

"In the past 17 years this 38-V is the very best that I have had," says Harry Pickett, Allegan, Mich., road contractor. His two Pioneer Model 38-V Duplex portable crushing-screening plants are powered with Waukesha Engines.

★ Air bases; runways, taxi strips and aprons for flyingfields; docks; access roads; military highways—are urgently needed for our armed forces everywhere.

And that takes aggregate—tons and tons of it!

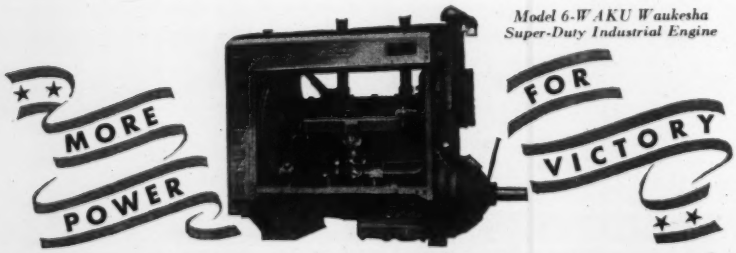
To supply it *quickly*, Uncle Sam is getting the current production of these portable Pioneer crushing-screening plants—many of them with Waukesha Super-Duty Power Units.

Contractor Harry Pickett gets real output—100 to 110 cu. yds. of minus ¾" per hr. *consistently* with his portable Pioneer plant. Its Waukesha Oil Engine Power Unit drives the 1036 jaw crusher, 3018 roll crusher, 3′ x 10′ 3½-deck vibrating screen and conveyors smoothly *and* effortlessly—with plenty of power in reserve for emergencies.

In addition to large capacity, the Waukesha Engine, with its moderate weight, gives the plant extra portability.

And by users' performance records, Waukesha Engines give the *greatest overall economy*. Get Bulletin 1079.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES



Model 6-WAKU Waukesha Super-Duty Industrial Engine

WAUKESHA ENGINES

WORKS, at Whitinsville, Mass., recently was awarded the U. S. Maritime Commission "M" Award for outstanding achievement.

SAMUEL HASKELL, now a resident of Buenos Aires, Argentina, has been selected as representative of the WILLAMETTE HYSTER CO. and ELECTRIC STEEL & FOUNDRY CO. of Portland, and the PACIFIC BRIDGE CO. of San Francisco, to carry on development work in South America. A native of Bay City, Mich., Mr. Haskell has resided abroad, chiefly in Buenos Aires, and in Bogota and Cartagena, Colombia for the past 20 years.

THOMAS MCMILLAN, former president of the CANADIAN FAIRBANKS MORSE CO., LTD., died recently at his home in Wilton, Conn. He was 74.

FRANK J. WESCHLER, vice president of the CHAIN BELT CO., and general manager of Baldwin-Duckworth, a division of Chain Belt Co. at Springfield and Worcester, Mass., died recently at Worcester.

Formation of a new war housing division to streamline the LIBBEY-OWENS-FORD GLASS CO'S. production of pre-fabricated homes for war workers, was announced recently. In an effort to assist the government to meet an acute housing shortage resulting from the unprecedented employment of workers in war plants, Libbey-Owens-Ford has formed the new housing division under management of RICHARD C. CARR, former Toledo building and construction expert. The company has converted part of its Ottawa, Ill. plant from the making of automobile glass to the manufacture of pre-fabricated homes and many one, two and three bedroom houses have already been produced.

W. R. COLEY, factory manager for LEEDS & NORTHRUP CO., Philadelphia, Pa., was in attendance at recent ceremonies marking the presentation of the joint Army-Navy "E" award to the company for its outstanding wartime performance. Speakers at the ceremonies included President C. S. REDDING, head of the com-

OUR CHRISTMAS WISHES FOR YOU...

May your holiday be drifted high with gifts and giving, with happiness and friends.

May your Christmas be a brisk and cheerful island in this year's savage seas.

May your New Year be a turning point towards constructive, peaceful days.

May your 1943 be useful, busy, prosperous. May you find it crowned with Victory.

May you never forget our thanks for years of cordial dealings.

May you continue to understand our war-caused delivery problems, and may you, like ourselves, close soon the biggest, busiest, hardest year of your entire history.

MATHEWS HYDRANTS

400 CHESTNUT STREET, PHILADELPHIA, PA.

ESTABLISHED IN 1803

Made by R.D. WOOD Company

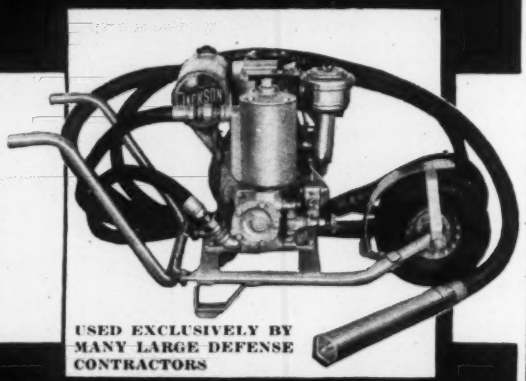
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

. . . If you want to make speed profitably . . . GET DEPENDABLE EQUIPMENT . . Buy the Fast . . .

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY

- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.



USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON, MICHIGAN

The 8 cu. yd. Bucket

460 foot Head Tower carrying 7 LIDGERWOOD CABLEWAYS on SHASTA DAM

HYDRO-ELECTRIC POWER, essential for numerous Metallurgical, Chemical and Manufacturing WAR INDUSTRIES is Developed by HUGE DAMS built by LIDGERWOOD CABLEWAYS

We proudly fly the Army-Navy "E" banner.

CABLEWAYS, HOISTS, CARGO WINCHES, CAPSTANS

LIDGERWOOD Established 1873 MANUFACTURING COMPANY

Main Office and Works ELIZABETH, NEW JERSEY

STEERING GEARS, WINDLASSES, TOWING ENGINES.

pany, WILLIAM L. BATT, vice-chairman of the War Production Board and Army and navy officers.

In a ceremony highlighted by an impressive salute to members of the armed forces who have given their lives in the service of the country, officers of the Army and Navy recently presented the Army-Navy "E" Award to the FAIRBANKS MORSE Co.'s South Milwaukee, Wis., plant.

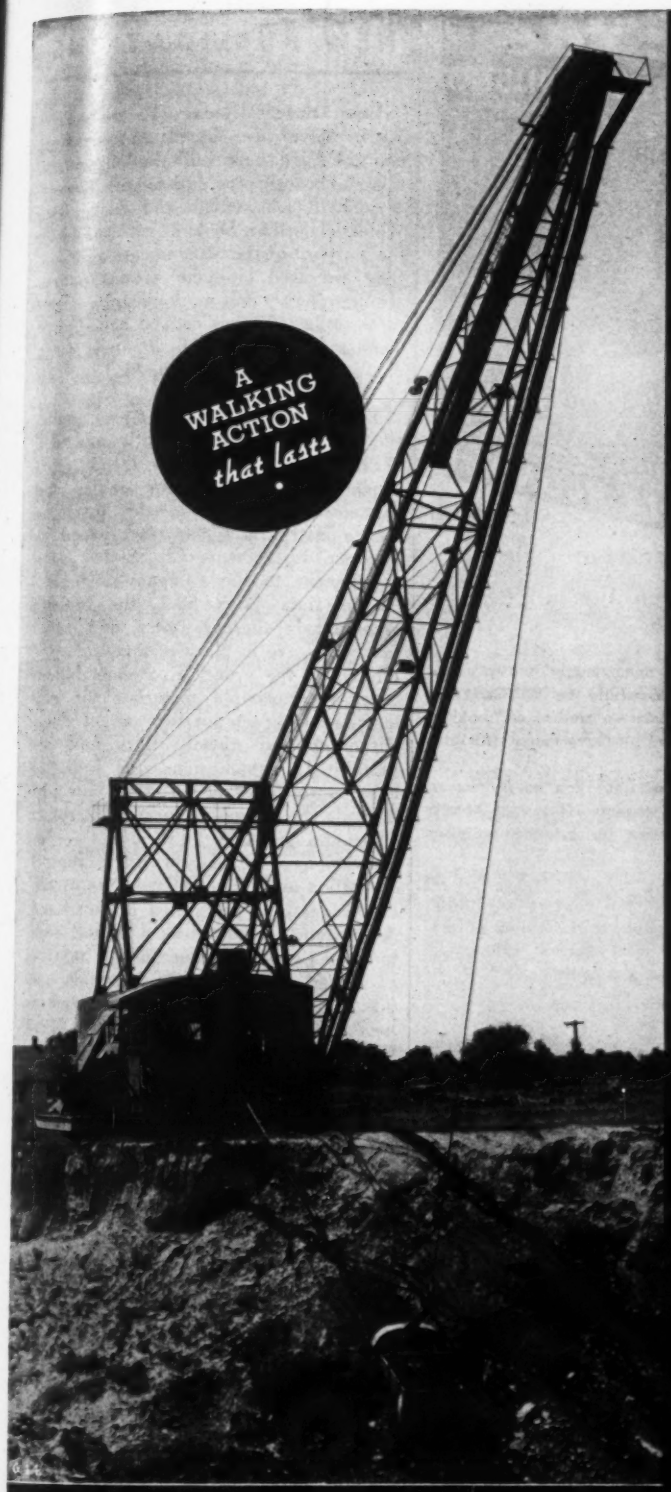
Appointment of W. M. ARMSTRONG, assistant chief of research and development of the CANADIAN NATIONAL RAILWAYS as general manager of CANADIAN NATIONAL TELEGRAPH, and retirement of D. E. GALLOWAY, assistant vice president, who has held the post for the past 11 years, has been announced.

DAVID W. HAERING, 34, president of D. W. HAERING & CO., INC., died recently in Oak Park, Ill. He had been president and technical director of the company bearing his name and was also an outstanding authority on scale and corrosion. The company acts as water consultants for many large industrial corporations.

The HOOSIER ENGINEERING COMPANY, 40 South Fifth Street, Columbus, Ohio, has recently leased a building at 195 East Chapel Street to provide 8,000 sq. ft. of floor space as additional storage space.

WILLIAM F. LAHL, research engineer in the engineering and research division of the CRANE COMPANY, Chicago, has accepted an appointment with the War Production Board in Washington, D. C. as a consultant in the valve and fitting section of the shipbuilding division.

A branch factory has been opened at Indianapolis, Ind., by GLENN-ROBERTS CO., manufacturers of G-R Welders. Located at 2107 Adams Street, the new branch will care for the expanded requirements of the company's eastern and mid-western customers. Sales headquarters for this area have been moved from Chicago to the new plant. JAMES E. VOSBURGH, associated with Glenn-Roberts Company since its inception will head the staff as general manager.



PIONEER and LEADER

THE first Walking Dragline, a Monighan, was shipped in 1913. During the succeeding 29 years, hundreds of these machines have proved themselves along the muddy banks of the Mississippi, in the sands of the All-American Canal, the rocky terrain of the Pennsylvania Anthracite Region, the remote mines of Alaska, South America, Nigeria, and the Far East. Today, with all-out war putting a tremendous premium on speed and dependability, Bucyrus-Monighan field-proved performance is especially vital.

Originator of the Walking Dragline, Bucyrus-Monighan today offers you a machine which is the result of consistently progressive design based on an unbroken experience dating from the beginnings of draglines. The essential simplicity and strength that stand behind the big output of today's Bucyrus-Monighans can only be the heritage of a long and successful history.

Bucyrus-Erie offers you a complete line of walking draglines, with buckets up to 20 yards in capacity and booms up to 250 feet in length. Whatever your size requirements, you can get a field-proved machine from Bucyrus-Erie.

SIMPLE • STRONG • PROVEN

Loads and stresses are distributed over a wide area by this exclusive Bucyrus-Monighan walking device.

BUCYRUS MONIGHAN

Bucyrus · Erie Co.

SOUTH MILWAUKEE, WISCONSIN

CONSTRUCTION activities, which involve uncommonly heavy trucking operations, are being handled successfully by TRUCKSTELL Conversions of 1½ ton new and used trucks—a method of "making big ones out of little ones" that is now approved by Government officials.

TRUCKSTELL can meet your requirements whether you need four or six wheel units— for tractor or conventional service—to mount heavy concrete units, large dump bodies or platforms for hauling building materials or heavy machinery.

Years of experience and thousands of practical conversions justify your confidence in this modern and advanced methods of building powerful, economical trucks to meet present emergency needs and after the war requirements.

Write for complete information.

TRUCKSTELL CLEVELAND

CONVERTERS of TRUCKS for EXPANDED USEFULNESS

DISTRIBUTORS of Tested and Approved TRUCK EQUIPMENT

TIME-TESTED JOINTING COMPOUND

for Bell and Spigot Water Mains

10 REASONS FOR USING

1. One lb. HYDRO-TITE equals 4 lbs. lead.
2. Stands any pressure the pipe can.
3. Joints showing seepage will take up.
4. Requires no calking so speeds job
5. Anyone can make tight joints.
6. Permanent as the pipe itself.
7. Stands deflection and vibration.
8. 30 years without a failure.
9. Shipped promptly.
10. Demonstration without charge.

***Write for* JOINTING BOOK**

HYDRAULIC DEVELOPMENT CORP.

50 CHURCH STREET — NEW YORK, N. Y.

NEW PUBLICATIONS

Pipe Outlets—Bonney Forge & Tool Works have just issued an attractive, two color, 16 page bulletin telling how to make branch pipe outlets with Bonney WeldOlets, ThredOlets and Socket-End WeldOlets. The booklet tells in detail the purpose of the attachments and how they are used to make various outlets stronger, better and more cheaply. Complete tables of specifications and dimensions are also included.—*Bonney Forge & Tool Works, Allentown, Pa.*

Interpretation—A new 6-page bulletin, interpreting the recently amended WPB Conservation Order L-134, as it applies to use of thermocouples and thermocouple protecting tubes for pyrometric instruments, has been issued by Wheelco Instruments Co. Styled as a supplement to the company's Thermocouple Data Book S2-3, the bulletin recommends thermocouples and tubes that will serve in place of materials prohibited by the order. Recommendations cover thermocouple materials for new installations in temperature ranges where chromium and nickel alloys now are prohibited; substitutions for radiation head target tubes of materials now prohibited; protection of tubes to replace chromium and nickel tubes, and recommendations for lead wire to replace chromium and nickel alloy wires of certain gages now prohibited or restricted. A convenient chart gives a partial summary of the WPB order and an analysis of various alloys to show materials prohibited or restricted.—*Wheelco Instruments Co., Harrison and Peoria Sts., Chicago, Ill.*

Protective Coating—For the convenience of its customers, the Inertol Co. has compiled, in its new folder No. 590, an index that will be helpful in quickly tracing the company's recommendations for various types of services, to prevent corrosion and deterioration.—*Inertol Co., Inc., Newark, N. J.*

Drills—Hardsteel in drills, reamers, tool bits and special tools is now deep in war production work, as evidenced by a new booklet distributed by the Black Drill Co. The booklet, pocket size, is a combined catalog and instruction book that gives brief details as to the type of product made by the company and information as to how the various products can be used.—*The Black Drill Co., 5005 Euclid Ave., Cleveland, Ohio.*

Fabrication—The Young Radiator Co. has for many years been expanding and improving its sheet metal production facilities. Like many manufacturers, the

efforts formerly devoted to peacetime products have been converted to war production—both of heat transfer units for military application and of special war products which are being made for the government directly or for prime contractors. Some of these special light and heavy sheet metal war products are described in a folder distributed by the company.—*The Young Radiator Co., Racine, Wis.*

Extinguisher Maintenance—The maintenance of fire extinguishers that are credited with stopping 70 percent of all fires is especially important in wartime production, according to the Pyrene Mfg. Co. To assist in proper maintenance, a new folder entitled "Directions for Inspecting, Recharging and Maintaining Portable Fire Extinguishers" has been published by the company.—*Pyrene Mfg. Co., 560 Belmont Ave., Newark, N. J.*

Wood Pipe—A booklet issued by the Armco Drainage Products Association tells of Armco emergency pipe, the wood pipe developed by the company to meet wartime conditions. Well illustrated, and containing tables showing strengths and applications of the pipe, the booklet claims that the pipe conserves metal, is light in weight, and will last as long as needed.—*Armco Drainage Products Associations, Middletown, Ohio.*

War Fences—In response to a demand at new war plants for industrial fences, the California Redwood Association has published a new data sheet entitled "Industrial Fences." The pamphlet presents information on two standard types of fencing, one constructed of random width Redwood boards, from 6 in. to 12 in.; the other of 12 in. boards with battens and fence cap. For each style of fence, a complete materials list is presented for heights from 6 ft. to 10 ft., inclusive. Sketches show all construction details.—*California Redwood Association, 405 Montgomery St., San Francisco, Calif.*

Water Analysis—A convenient, rapid and accurate method of calcium determination for routine plant control has been developed by W. H. & L. D. Betz, chemical engineers. This new method, simpler and quicker than the conventional gravimetric calcium analysis, is said to be the result of two years of research by Betz Laboratories. Details are given fully in Betz Technical Paper No. 81, entitled "Determination of Calcium in the Presence of Magnesium by Standard Soap Solution."—*W. H. and L. D. Betz, Frankford, Philadelphia, Penna.*

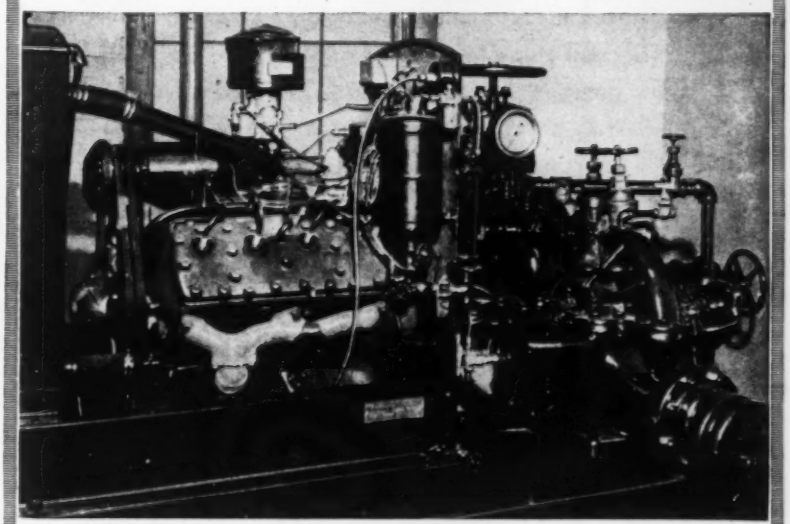
New, Simple

FIRE PUMPS

at Low Cost

● Adequate fire fighting equipment *now* is a vital necessity! Yet the smaller municipalities and factories often find conventional equipment too costly, too complicated.

New, simple, low-priced, Underwriters-approved Fairbanks-Morse fire pumping units have solved this problem for many . . . may do the same for you. F-M engineers are ready to aid in studying your needs. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago.



Ready for emergencies in Delavan, Wisconsin, stands this new Fairbanks-Morse fire pumping unit consisting of a 4" F-M Fire Pump driven by a direct-connected Ford-Mercury Engine—for which replacement parts and service are available in nearly every village.

FAIRBANKS-MORSE F-M PUMPS DIESELS MOTORS SCALES

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HANDLE More Tonnage... MOVE It Faster... Cheaper With the Locomotive that Stays on the Job

● You get real action with a Plymouth Locomotive . . . action that means more tons per hour, at less cost per ton. Plymouth has POWER to pull big loads; SPEED and VERSATILITY for fast service on both long and short hauls; RUGGEDNESS to stand up under the roughest, toughest kind of service . . . for many years. Top off those features with the operating economy of gasoline or diesel power and you'll know why "Plymouth Means Performance" . . . at its best.

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MEN AND JOBS

Forney W. Fleming has resigned as instructor in the civil engineering department at the University of Texas and has reported to duty as a first lieutenant in the Corps of Engineers.

Leading Mexican civil engineers and architects, headed by Ings. **Guillermo Torres, Alberto Munoz Cases** and **Victor Jose Moya,** professors of the Schools of Engineering and Architecture, and the National Faculty of Engineers, have organized the Corps of Engineers and Architects at the Service of National Defense, placing themselves at the disposition of the Mexican government for war work.

Roy T. Messer, assistant traffic engineer of the Iowa State Highway Commission for 17 years, has been granted a leave of absence to accept a commission as a lieutenant (jg) in the Navy.

Warwick C. Thomas, senior engineer of the Virginia State Highway Department, has resigned to accept a position with the Civil Aeronautics Administration, to be stationed at LaGuardia Field, New York.

Lieut. J. A. Coddington, of the Naval Civil Engineering Corps is officer in charge of construction of a naval station in North Carolina.

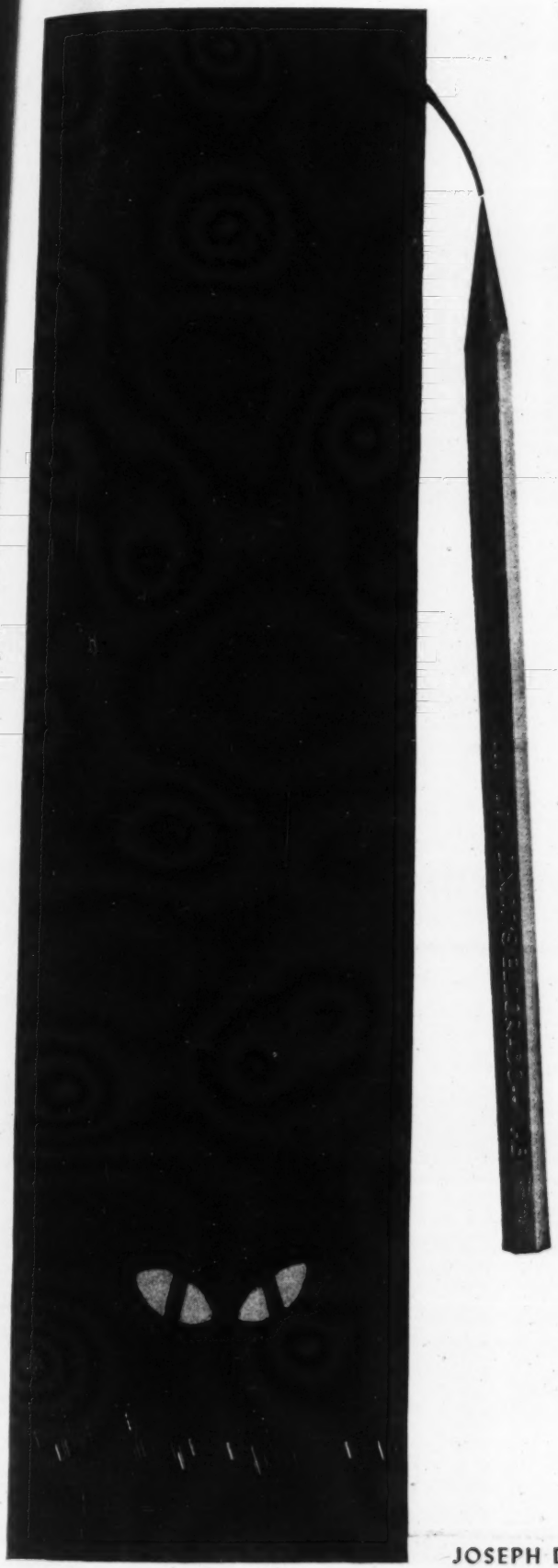
Capt. J. L. Hurley, of Fredericton, N. B., who has been appointed a director of organization at the headquarters of the Royal Canadian Air Force is a graduate of the engineering school of the University of New Brunswick.

Horace W. Odendahl, for 23 years an engineer with the Des Moines, Iowa, Street and Parks department, recently reported for active service in the U. S. Army.

Hugh I. Jenkins, Jr. of Savannah, Ga., has recently been promoted to the rank of first lieutenant in the Corps of Engineers.

Byron Hewitt, construction engineer for the WPA at Columbia, Mo., has been nominated county surveyor by the Boone Democratic Executive Committee. He succeeds **J. E. Bilby,** who resigned recently to enter military service.

Vernon F. Hobbs, of Raleigh, N. C., a civil engineer in the bridge department of the North Carolina Highway and Public Works Commission for many years, has just been commissioned a first lieu-



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Typhonite Eldorado Pencils make such lines! Opaque lines! Lines firm and solid, lines as black as a black feline. This is the kind of line wanted in today's drawings—because today's blueprints must be clean as the path of a bullet.

Why is the *Typhonite* Eldorado line so opaquely black? Simply because the Eldorado's lead is *Typhonite*. No other drawing pencil has *Typhonite* leads. *Typhonite* is created out of natural graphite by an exclusive Dixon process. Try *Typhonite* Eldorado Pencils in any of the 17 degrees of your choice.

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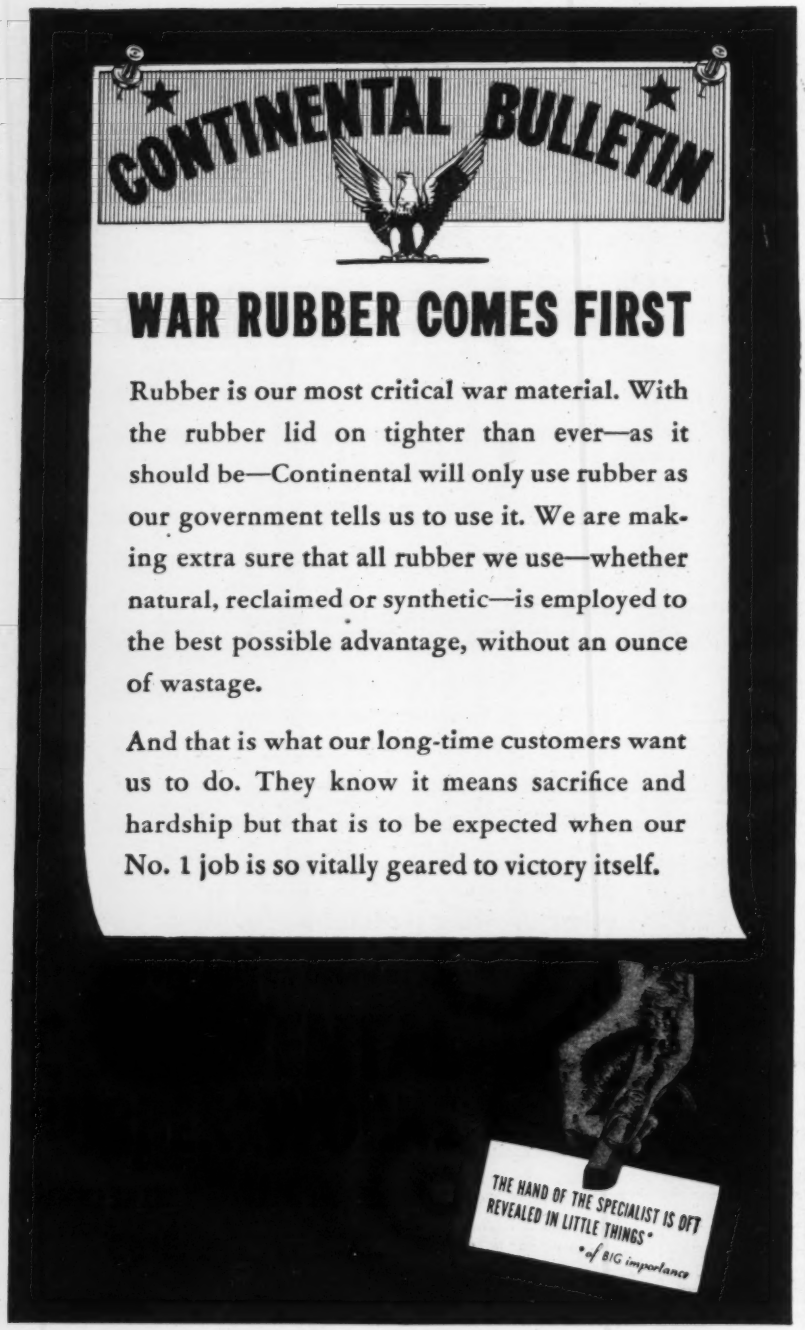
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Rubber is our most critical war material. With the rubber lid on tighter than ever—as it should be—Continental will only use rubber as our government tells us to use it. We are making extra sure that all rubber we use—whether natural, reclaimed or synthetic—is employed to the best possible advantage, without an ounce of wastage.
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tenant in the Army Air Corps.

J. L. Franzen, city manager of Oregon City, Ore., has been appointed director of all activities in "Kaiserville", at Portland's sprawling 10,000 unit housing project.

L. M. Jones, Alabama State Highway Department resident engineer at Union Springs, has been granted a leave of absence to join the U. S. Navy as a chief carpenter's mate.

W. H. Charbonnet, a recent graduate of the Tulane University college of engineering, has been promoted from ensign to lieutenant, j.g., in the U. S. Navy.

John A. Race, an assistant superintendent in the Cincinnati, Ohio, highway maintenance division, has been granted a leave of absence to join the Corps of Engineers with a rank of first lieutenant.

Lt. Col. H. G. Gerdes, formerly in charge of construction of an air depot in Georgia, has been transferred to Atlanta, Ga., to become area engineer in charge of a construction project there.

Marion Goggans, district manager for the WPA at Orlando, Fla., for the past three years, has been commissioned a first lieutenant in the Corps of Engineers.

Frank Kirkpatrick, head of a Milwaukee, Wis., building firm, has been appointed manager of the Milwaukee war housing center, specializing in converting old dwellings into flats and apartments.

Lee C. King, district safety engineer for the past two years with the Porto Rico Engineer District, has been transferred to the Philadelphia Engineer District.

Maj. William B. McDonald has succeeded Capt. Russell Stewart as area engineer in charge of construction of a hospital near Vicksburg, Miss.

R. J. Milligan, formerly assistant District 23 highway engineer at Brownwood, Tex., has been installed as acting district engineer, succeeding **Leo Ehlinger,** who resigned recently.

Wesley Brown, resident state highway engineer for Brown, Coleman and McCulloch counties, Texas, resigned recently to join the Corps of Engineers.

W. C. Flack is now assistant construction engineer on the Sunflower ordnance plant in Kansas for the William S. Lozier, Inc., and Broderick & Gordon.

O. J. Semmes, Jr., city engineer of Pensacola, Fla., has become a first lieutenant in the Corps of Engineers. He had been city engineer since 1932.

Arthur A. Scott, Greensboro, N. C., consulting engineer, has been commissioned a lieutenant in the Army Air Corps.

Dalton L. Reid, city engineer of Lafayette, La., for several years, has been granted a leave of absence for the duration to take a commission as a first lieutenant in the Corps of Engineers.

Richard G. Williams, of Somerset, Ky., has become Kentucky's rural highway commissioner. He succeeds his brother, the late Cecil T. Williams.

Capt. Henry S. Brooks, of Oxford, N. C., area engineer at Tampa, Fla., has been promoted to the rank of major.

Col. George Gillette, recently appointed district engineer for the Boston, Mass. district, was formerly district engineer at Wilmington, N. C., and later executive officer of the engineering center at Fort Belvoir, Va.

T. C. Hartman, senior office engineer in the construction department of the North Carolina state highway and public works commission, has resigned to join the U. S. Navy.

L. W. Veigel, city engineer at Dickinson, N. D., since 1933, has become a member of the Army sanitary corps.

Richard E. Bell, of Raleigh, N. C., formerly a structural engineer for Olsen, Dietrick, Carr and Greiner on a U. S. Marine Corps project in North Carolina, has been named industrial specialist at the Raleigh, N. C., office of the War Production Board.

H. R. Gesley has been appointed city engineer at Watertown, S. D., to succeed Ralph Reed who resigned last spring.

Harry V. Wenger, Indianapolis consulting engineer, has joined the War Production Board as principal engineer of the water production section.

W. B. Ferguson, engineer for the North Carolina State Highway and Public Works Commission, has been named commander of the Weaverville, N. C., Citizens Defense Corps.

J. M. Jarrett, of Raleigh, N. C., consulting engineer for the North Carolina State Board of Health since 1936, has been appointed a captain in the U. S. Public Health Service and assigned to duty at Bethesda, Md.

Architect: Walter Martens, Charleston. General Contractors: H. B. Agston & Sons, Charleston.

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MEETINGS

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Hotel Statler, St. Louis, Mo., Dec. 7-9.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, Society headquarters, New York, N. Y., Jan. 20-22, 1943.

REGIONAL AND LOCAL MEETINGS

NEW YORK STATE HIGHWAY CHAPTER, A.G.C., war conference, De Witt Clinton Hotel, Albany, N. Y., Dec. 9 (dinner)-10.

NORTHERN CALIFORNIA CHAPTER, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 24th annual convention, Palace Hotel, San Francisco, Dec. 11-12.

COLORADO SOCIETY OF ENGINEERS, 27th annual meeting, Shirley-Savoy Hotel, Denver, January 8th and 9th.

ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES, Highway Problems Conference, Hotel Pennsylvania, New York, N. Y., Feb. 17-19, 1943.

Elections and Activities

DIRECTORS of the Carolinas Branch of the Associated General Contractors of America, meeting at Charlotte, N. C., recently, instructed Collier Cobb, Jr., president of the group, to appoint a committee to nominate a slate of officers for 1943. This new method of electing officers was made necessary because the organization has called off its annual convention this year, due to the war emergency and transportation restrictions. The terms of present officers expire December 31 of this year. Each member will have the opportunity of submitting additional names after the slate is presented by the nominating committee, and these names will be added to the list upon which the members are to vote by mail.

ARTHUR RICHARDS, executive engineer for the Village of Larchmont, N. Y., was re-elected president of the American Association of Engineers at the twenty-eighth annual meeting of the board of directors of the association. Pecos H. Calahan, Glendale, Calif., assistant secretary of the California State Board of Registration for Civil Engineers, was elected vice-president, and Major Henry Baker, Jr., was elected a director. Earl F. Ronneberg, president of E. F. Ronneberg & Co., Chicago, was elected assistant treasurer, succeeding Major Donald M. Cook, now in active service.

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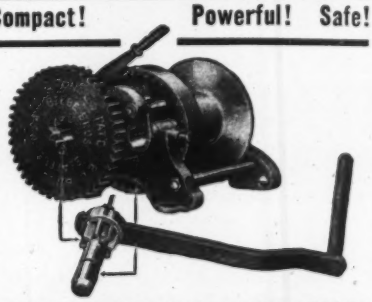

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Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

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When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

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"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"

Club, at a meeting recently, elected Arvin Page as president for the coming year. Other officers include R. A. Thomas, vice-president; C. E. Stephens, secretary and treasurer; and J. C. Mason and N. J. Cromer, directors.

PROBLEMS confronting civil engineers as a result of the war effort were discussed at the annual meeting of the Mid-South section of the American Society of Civil Engineers at Little Rock, Ark. Speakers at the meeting include J. M. Page, Arkansas engineer for the Public Roads Administration, R. E. Warden, engineer for the Missouri-Pacific Railroad, Earl Grochau, engineer for the Memphis Construction Co., and others.

New officers of the section, as elected at the meeting, are: J. M. Page, president; Lee H. Johnson, Oxford, Miss., vice-president; A. E. Johnson, Little Rock, Ark., secretary-treasurer; Earl Grochau, director for Tennessee; G. B. Davis, chief of design for U. S. Engineers, Vicksburg, director for Mississippi; Vic Anderson, Little Rock, director for Arkansas; and Halph Hansen, Little Rock, director at large.

PRESIDENT CY WASHBURN, of the Jacksonville, Fla., Engineering Professions Club, recently announced appointment of members of the organization to the various executive committees. Other officers of the club include: E. J. Sperling, vice-president; J. Gordon Jones, secretary; Leon Frank, treasurer, and C. G. Easterday, program director.

R. H. RIMMER is the newly elected chairman of the Saguenay Branch of the Engineering Institute of Canada. Born at Burlington, N. C., in the United States, he was educated at the University of North Carolina.

NEW officers of the Iowa Chapter of the American Institute of Architecture are: Burdette Higgins, Des Moines, president; Ralph Arnold, Sioux City, vice-president; Karl K. Keffer, Des Moines, and David Toenjes, Waterlook, executive Committee members. Leonard Wolf, of Ames, was re-elected secretary-treasurer.

AT THE tri-ennial reunion of graduates of the Faculty of Applied Science and Engineering of the University of Toronto, Alumni Medals were awarded to Col. W. E. Phillips, president of Research Enterprises Limited, of Toronto, and to W. P. Dobson, chief testing research engineer of the Hydro Electric Power Commission of Ontario, for their achievements in engineering. Major M. B. Hastings was elected president of the Engineering Alumni Association at its annual meeting, with Otto Holden as first vice-president.

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Time-Saving on Response

. . . because the simple, straightline mechanism of the Kennedy Safetop functions smoothly no matter how seldom the hydrant may be operated, and the large unobstructed passageways throughout the hydrant reduce friction to a minimum.

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. . . because, if broken by a smashing impact, the Kennedy Safetop can be returned to service within half an hour, by one man, with a few standard tools, without excavating, and at a total cost of less than $10 for repair parts and labor.

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Write for bulletin describing this hydrant; termed by water department superintendents as 'the most important advance ever made in fire hydrant design.'

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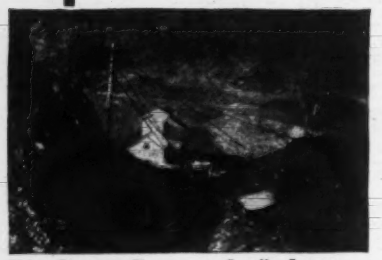
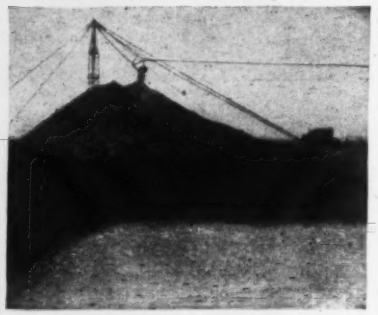


This Picture Shows a Small Sauerman Scraper Reclaiming Coal Mine Screenings from Waste Pile to Washing Plant.



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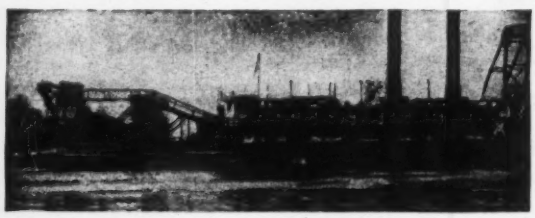

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Miscellaneous Notes on Booklets and Reprints

(*Continued from p. 95*)

pamphlet entitled "When Demobilization Day Comes," issued by the National Planning Association, 800 21st St., N.W., Washington, D. C., as its Planning Pamphlet No. 14 - (25 cents). It relates chiefly to the demobilization of the armed forces and the transformation of our war plants and war workers back to meeting normal peace-time needs.

TWO EMERGENCY CODES that have been in preparation for some time by the Public Buildings Administration, Federal Works Agency, have just become available in printed form. They are "Air Raid Protection Code for Federal Buildings and Contents" (Price 20 cents) and Code for Protection of Federal Buildings and their contents from Subversive Hostile Acts (Price 10 cents). Both can be obtained from the Superintendent of Documents, Washington, D. C.

New Engineering Books

CAN OUR CITIES SURVIVE?—By J. L. Sert. 259 pp. Harvard University Press, Cambridge, Mass. $5.

STEEL AND TIMBER STRUCTURES—By G. A. Hool and W. S. Kinne; revised by R. R. Zipprodt and D. M. Griffith. 733 pp. McGraw-Hill Book Co., New York and London. $6.

MERRIMAN'S STRENGTH OF MATERIALS—Eighth Edition. Revised by Edward K. Hankin. 148 pp. John Wiley & Sons, Inc., New York & London. $1.50.

U. S. GOVERNMENT MANUAL—Fall, 1942. 705 pp. Superintendent of Documents, Washington, D. C. or U. S. Information Center, 1400 Pennsylvania Ave., N. W., Washington, D. C. Single copies $1; subscriptions covering three editions per year, $2.75.

SHORT COURSE IN SURVEYING—By Raymond E. Davis and Joe Wallace Kelly. 330 pp. McGraw-Hill Book Co., New York and London. $2.50.

PROCEEDINGS OF THE FOURTEENTH SEMI-ANNUAL EASTERN PHOTOELASTICITY CONFERENCE—$1.50 from Professor E. O. Waters, Room 111, Winchester Hall, Yale University, New Haven, Connecticut.

GOALS FOR AMERICA: A BUDGET OF OUR NEEDS AND RESOURCES—By Stuart Chase. 134 pp. The Twentieth Century Fund,

330 West 42nd St., New York. $1 per copy; or $5 for series of six books. *Second of a series of books to focus attention on post-war problems under the general title of "When the War Ends."*

ACCOUNTING FUNDAMENTALS — By Richard E. Strahlem. 365 pp. The Ronald Press Company, New York. $3.50.

INTRODUCTION TO ENGINEERING ECONOMY—By Baldwin M. Woods and E. Paul DeGarmo. 441 pp. The Macmillan Company, New York. $4.

THE NATIONAL PAINT DICTIONARY—Second Edition. By Jeffrey R. Stewart. 224 pp. Stewart Research Laboratory, 1340 New York Ave., N. W., Washington, D. C. $7.50.

Reports and Pamphlets

MAINTENANCE METHODS FOR PREVENTING AND CORRECTING THE PUMPING ACTION OF CONCRETE PAVEMENT SLABS — Wartime Road Problems No. 4. Highway Research Board, 2101 Constitution Ave., Washington, D. C.

THE FLOODS OF MAY 1942 IN THE DELAWARE AND LACKAWANNA RIVER BASINS—Commonwealth of Pennsylvania, Department of Forests and Waters.

THE MICHIGAN TEST ROAD—Michigan State Highway Department, Lansing, Michigan. $1.50.

A. S. T. M. STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS—Methods of testing specifications, definitions, charts and tables. American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. $2.25.

MILITARY AND NAVAL MAPS AND GRIDS—The Dryden Press, Inc., New York. $1.

THE FUTURE OF TRANSPORTATION—One of a series of digests of reports of the National Resources Planning Board, Washington, D. C.

STANDARDS ON THE CLASSIFICATION AND COMPENSATION OF PROFESSIONAL ENGINEERING POSITIONS — Second Revision. American Association of Engineers, 8 South Michigan, Chicago, Ill. 35c.

AIR RAID SHELTERS IN BUILDINGS—U. S. Office of Civilian Defense, Washington, D. C.

PROTECTIVE CONSTRUCTION—U. S. Office of Civilian Defense, Washington, D. C.

MOMENTS IN I-BEAM BRIDGES—Engineering Experiment Station Bulletin Series No. 336. University of Illinois, Urbana. $1.

LITTLE ROCK MUNICIPAL WATER WORKS—Little Rock, Arkansas. Sixth Annual Report.

SOMERVILLE, MASS.—Annual Report of the City Engineer.

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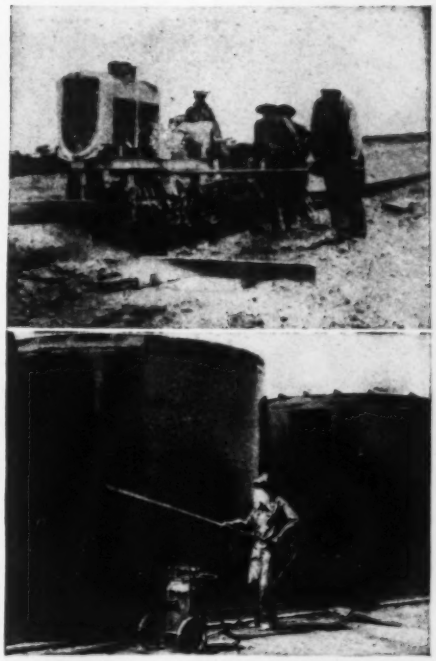

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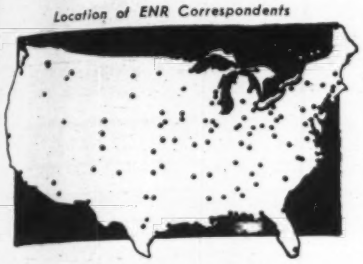
(Daily service also available—Write for details)

Location of ENR Correspondents



Symbols and Abbreviations Include

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect — Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges, Grade Cross'gs
Streets & Roads
Earthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

Ill., Oglesby—E. Hand, city clk., water softening plant. $30,000.

O., Shelby—Bd. Control, 6 ft. submerged type dam across Black Ford River, 5,700 ft. pipe line. $25,000-$30,000. Seeking approval State Bd. Health.

†Ore., Pendleton — City, C. L. Lieuallen, mayor, filtration plant. $376,000. **FWA.** F. S. Zeidlhack (John W. Cunningham & Associates), Spalding Bldg., Portland, engr. CD 8/20.

Wis., West Bend—K. H. Weiss, city clk., surveys water supply addn., new wells. Suhr, Berryman, Peterson & Suhr, 130 N. Wells St., Chicago, Ill., engrs.

Ont., Wallaceburg — Municipality, WW imprvs., 6 in. watermain. $25,000. Engineer, c/o W. Glendinning, Town Hall, engr.

Que., Cap de La Madeleine—F. Beaumier, municipality clk., well. $25,000.

Que., La Tuque—Municipality, water and sewer extens. for Wartime Housing project. $40,000.

BIDS ASKED

Bids Asked December 10

†Wash., Milton—Kay Kirkland, town clk., Town Hall, reservoir and water distr. sys. $23,000. **FWA.** Plans deposit $10. Parker & Hill Smith Tower, Seattle, engrs. CD 9/23—ENR 10/2.

Bids Asked About December 12

†Texas—U. S. Eng., 231 W. Main St., Denison, water, sanitary sewer and gas lines, area grading, etc., Smith Co. Plans deposit $50.

Bids Asked December 16

†Md., Hyattsville — Washington Suburban Sanitary Comn., Hamilton St., Contr. 2, **FWA** Proj. MD 18-175, c.i. watermains., adv. ENR 12/3.

Bids Asked January 19

†N. Y., Northport—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., D. C., deep well and pump.

LOW BIDDERS

D. C., Wash.—Dist. Comrs., District Bldg., Nov. 24, watermains, sewers, for Parkside Dwellings, from Leo Butler Co., 8416 Georgia Ave. N.W., Silver Springs, Md., **$85,874.** CD 11/17—ENR 11/19.

†South Carolina—U. S. Eng., Walterboro, Nov. 13, water sys. extens., Colleton Co., from Deconyck & McDaniel, Sumter.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, Nov. 16, water treatment plant, Cameron Co., from Dodds & Wedegartner, Inc., 382 N. Bowie St., San Benito. CD 11/10.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, water storage tank, pumphouse, piping, electrical distr. sys. extens., Tom Green Co., from Ross Constr. Co., Brownwood.

†Tex., Hooks—Federal Works Agency, Electric Bldg., Fort Worth, Nov. 24, WW and sewers, Tex. 41-384, from Williams & Whittle, 5422 Mockingbird Lane, Dallas, **$390,000.** CD 11/11.

CONTRACTS AWARDED

†Alabama—U. S. Eng., Gadsden, WW and sanitary sewers, Etowah Co., to Sullivan, Long & Haggerty, Bessemer. Est. **$250,000.** Bids 11/18.

†Delaware—U. S. Eng., 6 and Walnut Sts., Phila., Pa., water distr. sys., storm sewers and sanitary sewerage sys., New Castle Co., to Queens Water Pipe Corp., 96-29 Rockaway Blvd., Ozone Park, N. Y., under **$50,000.**

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, WW motors and pumps, Inv. Neg-M.N.-43-9, to Couch Mfg. Co., Grant, under **$100,000;** drainage sys., Inv. Jax-43-334, to W. T. Price Dredging Corp., 3200 S.W. 27 St., Miami, under **$500,000,** both Palm Beach Co. Awarded 11/7.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, water distr. and collection sys., Inv. NEG-JAX-43-341, Orange Co., to Langston Constr. Co., Orlando, under **$50,000.** Awarded 11/10.

†Florida—U. S. Eng., U. S. Courthouse & Customhouse, Jacksonville, water distr. and sewage disposal sys., Inv. Neg-Jax-43-356, Orange Co., to C. T. Dawkins, 2424 Chicago Ave., Tampa, under **$500,000.** Awarded 11/12.

†Georgia—U. S. Eng., Post Office Bldg., Savannah, wells with complete pump. equip., Bulloch Co., to Stevens Southern Co., 2555 W. Beaver St., Jacksonville, Fla., under **$50,000.**

N. C., Charlotte — R. W. Flack, city mgr., watermains, to Boyd & Goforth, 617 N. Smith St., **$71,641.** CD. 11/17—ENR 11/19.

†N. C., New Bern—City, WW imprvs., Docket NC 31-178, Sect. 1, wells, to Layne-Atlantic Co., Cromwell Rd. and Flanders Ave., Norfolk, Va., **$73,250***** Sect. 2, pumphouse, to P. T. Withers, Gastonia, **$94,573***** Sect. 3, pipeline, to Higgins & Gaines, Greensboro, **$129,562.** Grand total $297,385. **FWA.** Bids 11/18. CD 10/30—ENR 11/5.

†O., Fairfield—Federal Works Agency, 222 W. No. Bank St., Chicago, Ill., pump. plant, reservoir, mains and equip., to W. F. Schmidt, 1047 Philadelphia Dr., Dayton. **$27,429.**

†R. I., Newport and **Tiverton** — Federal Agency, 2 Lafayette St., New York, N. Y., subaqueous water lines in Newport and Tiverton, to P. J. Cox Constr. Co. Inc., 270 Bway., and Spearin, Preston and Burrows, Inc., 60 Church St., both New York, N. Y. **$240,000.**

†Texas—U. S. Eng., 231 W. Main St., Denison, expanding water treatment plant, Solic. 257-43-132, Bowie Co., to Dallas Foundation Co., Mullins Ct., Apt. 9, Dallas. **$50,000-$100,000.** Bids 11/14.

†Texas—U. S. Eng., Fort Sam Houston, storage reservoir, Spec. 42-516, Brown Co., to A. L. Bucy, Brownwood, under **$50,000.**

†Tex., Garland—City, brick pumphouse, electrically-motor-driven deep well turbine pump, 2 electrically-driven booster pumps, etc., Tex. 41-908, to Southern Engine & Pump Co., Great Natl. Life Bldg., Dallas, **$29,240. FWA.** H. B. Gieb & Co., Texas Bank Bldg., Dallas, engrs.

★**†Tex., Houston**—City, c/o C. A. Pickett, mayor, City Hall, general contract earthen water supply dam, locks, 3 low-head lift stations, canals and ducts to furnish water for Houston vic. industries, incl. 100 m.g. storage reservoir, deep wells, bulkhead and spillways, San Jacinto River, 25 mi. from here, to Brown & Root, Inc., 4300 Calhoun Rd.*** concrete pipe, to Gifford-Hill Pipe Co., Mercantile Bldg., Dallas, **$378,545***** pumps, to Southern Engine & Pump Co., 900 St. Charles St., **$72,934.** Est. $2,100,000. **FWA.** CD 11/5.

†Washington—U. S. Eng., 800 3 Ave., Seattle, water supply line, also steam supply and distr. sys., to Spencer B. Lane Co., 251 Kearney St., San Francisco, Calif., both **$100,000-$500,000;** incinerator, to Hansen & Weidner, 1517 W. Jackson St., Spokane, under **$50,000,** all foregoing in Spokane Co.

†Washington—U. S. Eng., 800 3 Ave., Seattle, WW supply sys., Spokane Co., to R. L. Bair, 1220 Ide St., Spokane, under **$50,000.**

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, installing hydraulic water pipelines, to Hyland, Hall & Co., Madison.

N. S., Windsor—Dpt. Natl. Defense, Ottawa, Ont., water and sewerage sys., Military Camp, to Fundy Constr. Co., Ltd., Russell and Islesville Sts., Halifax, **$115,000.**

Ont., Weston — Altering WW, to H. E. French Constr. Co., Ltd., 530 Russell Hill Rd., Toronto, **$36,500.** CD 11/4—ENR 11/12.

Sask., Riverhurst—Prairie Farm Rehabilitation Administration, 910 McCallum Hill Bldg., water intake at pump. station, to Bird Constr. Co., Ltd., 7 and Smith Sts., Regina, **$40,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Long Beach—Incinerator, imprvs. at site. $300,000. G. E. Baker, City Hall, engr.

Ill., Marion — H. K. Crisp, mayor, imprv. sewage treatment plant. F. W. Thane, City Hall, engr.

Ill., Oglesby—E. Hand, city clk., sewage disposal plant. $100,000.

O., Springfield—8 sewers, east side residential area. $26,113.

†Texas—U. S. Eng., Fort Sam Houston, storm drainage sys., Bexar Co. $80,000 authorized.

BIDS ASKED

Bids Asked in December

†Calif., Burbank—Federal Works Agency, 1206 Santee St., Los Angeles, 4th sect. Lockheed storm drain, Docket Calif. 4-458, Contr. 4. Over $15,000. Plans deposit $25. W. L. Felt, 1206 Santee St., Los Angeles, engr.

Bids Asked December 8

Ont., Hamilton—J. F. Berry, city clk., storm sewer Strathearns Ave. $300,000. W. F. McFaul, City Hall, engr. CD 11/24.

Bids Asked December 16

Calif., Los Angeles—Bd. P. Wks., sanitary sewer, Mammoth Ave. and Davana Terrace Sewer Dist. Bids Sept. 16, rejected. CD 9/22—ENR 9/24, under LB.

LOW BIDDERS

†Calif., National City — Federal Works Agency, 1206 Santee St., Los Angeles, Nov. 20, sewage pump. plant, with appurtenances, discharge lines and track supports for railroad, at 3 locations, from M. F. Kemper Constr. Co., 3704 Clarington Ave., Los Angeles, **$103,465.** CD 11/16.

†Ind., Connersville — Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., Nov. 19, storm water drainage, from Santucci Constr. Co., Skokie, Ill., **$36,000. FWA.** CD 11/10—ENR 11/12.

†Md., Cheverly—Washington Suburban Sanitary Comn., Hamilton St., Hyattsville, Nov. 18, sanitary sewers, 62 St., Contr. 162-S, from Leo Butler Co., Silver Springs, **$98,028.**

†Nebraska — Pub. Housing Auth., NHA, Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., sewer, water, electrical sys., utilities, etc., from Inland Constr. Co., 3867 Leavenworth St., Omaha. Est. **$114,500.** M. S. Sharp, 1221 Baltimore St., Kansas City, Mo., archt.

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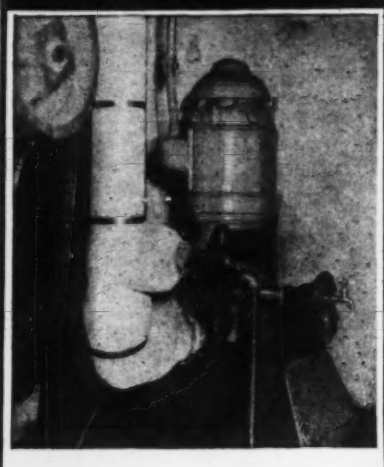

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SEWERS (Low Bidders, Continued)

Pa., Phila.—General State Auth., 2 and Locust Sts., Harrisburg, storm, sanitary sewers, Phila. (Byberry) State Hospital, from Chas. J. Corr, Widener Bldg., **$54,457.**

†**South Carolina**—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., sewage disposal plant, Greenwood Co., from Nicholes Constr. Co., 1190 Caroline St. N.E., Atlanta, Ga.

CONTRACTS AWARDED

†**California**—U. S. Eng., 1209 8 St., Sacramento, sewage disposal plant, Spec. 219, Sacramento Co., to D. W. Nicholson, 1701 San Leandro Blvd., **$100,000-$500,000**; electrical work, to Luppen & Hawley, Inc., 3126 J St., Sacramento.

Massachusetts—Industrial Company, 1 story, 35 x 55 ft. cinder block incinerator, to McCutcheon Co., 250 Stuart St., Boston. CD 11/17—ENR 11/19.

†**New Jersey**—U. S. Eng., 6 and Walnut Sts., Phila., Pa., sewerage sys., sewage disposal plant, Burlington Co., to J. A. Johnson, 270 1 St., Brooklyn, N. Y., under **$50,000.** Malcolm Pirnie, 25 W. 43 St., New York, N. Y., engr. and archt.

N. J., Englewood—12 in. sanitary sewers. **WPA. $75,000.** C. Malstrom, Orange and N. 6 Sts., Newark, WPA engr.

N. J., Garwood—Boro, sanitary sewerage sys., to Guy Villa & Sons, Inc., Raritan Rd., Westfield, **$25,000.** Bids 9/29. CD 9/28—ENR 10/1.

N. J., Little Ferry—Boro, sanitary sewers, replacing pavement, etc., Franklin and Christenia Sts. **WPA. $50,500.** C. Malstrom, Orange and N 6 Sts., Newark, WPA engr.

Ore., Albany — Trunk line sewers, Maple and 12 Sts., own forces. **$25,000.**

†**Tex., Texarkana** — City, W. V. Brown, mayor, garbage disposal facilities, purchase and hire. **$25,000. FWA.**

BRIDGES GRADE CROSSINGS

PROPOSED WORK

Tex., Orange — A. Sokolski, mayor, bridging, grading, for road development. $98,600. Applied for FWA funds.

Wis., Appleton—City, E. E. Sager, clk., and State Hy. Comn., Madison, bridge. $195,000. Chas. H. Kirch, State Office Bldg., Madison, engr.

Que., Sawyerville — Compton Co., L. B. Farnsworth, clk., bridge over Seale River. $25,000. O. Desjardins, Dpt. P. Wks., Quebec City, engr.

CONTRACTS AWARDED

Minnesota—State Hy. Dpt., St. Paul, bridge removal, Winona Co., to M. E. Souther, 1528 Branston St., St. Paul, **$41,654.** Bids 11/20. CD 11/17—ENR 11/19.

†**South Carolina**—U. S. Eng., Shaw Field, bridge, Richland Co., to Boyle Constr. Co., Sumter.

†**Texas**—U. S. Eng., Fort Sam Houston, concrete low-water crossings, Brown Co., to J. E. Dickey, 216 Eleanor St., San Antonio, **$50,000-$100,000.** CD 11/20—ENR 11/26.

Ontario—Provincial Govt., Toronto, bridge over White River, New Liskeard; bridge across Blanche River between Englehart and Charlton, to R. A. Blythe Constr. Co., Ltd., 7 St. Andrew Gardens, Toronto, **$26,000** each.

Que., Sawyerville — G. W. Loveland, municipality clk., concrete bridge, abutments, approaches over River Eaton, to Poudrier & Boulet, Ltd., 14 Main St., Black Lake. Est. **$25,000.** O. Desjardins, Dpt. P. Wks., Quebec City, engr.

STREETS AND ROADS

BIDS ASKED

Bids Asked December 9

New York—State Dpt. P. Wks., Div. Hys., Albany. A. W. Brandt, supt., imprv. 0.22 mi. hy. Erie Co., plans deposit $5; 0.23 mi. Niagara Co., plans deposit $5; 0.34 mi. Oneida Co., plans deposit $5.

Bids Asked December 11

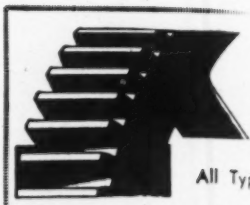
Nebraska—Dpt. Roads & Irrigation, Lincoln, graveling 6.4 mi. FAS-121-B, Cedar Rapids-Belgrade. W. G. Scott, Lincoln, state engr.

Bids Asked About December 11

†**Kansas**—U. S. Eng., Albuquerque, N. M., grading, hard paving, Finney Co. $450,000. Plans deposit $100.

Bids Asked About December 12

†**Texas**—U. S. Eng., 231 W. Main St., Denison, roads, streets, drainage facilities, Smith Co. Plans deposit $50.



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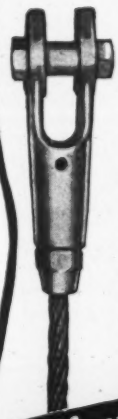

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STREETS, etc. (Bids Asked, Continued)

Bids Asked

Iowa—State Hy. Comn., Ames, rejected bids Oct. 6, imprv. 7.643 mi. road Mills Co. CD 10/3—ENR 10/15, under LB.

Iowa—State Hy. Comn., Ames, rejected bids Nov. 17, imprv. 0.291 mi. road, Clinton Co. CD 11/20—ENR 11/26, under LB.

Kentucky—Dpt. Hys., Frankfort, rejected bids Nov. 6, imprv. 10.231 mi. Henderson Co.; 3.228 mi. Union Co. CD 11/10—ENR 11/12 under LB.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, grading 250,000 cu. yd. excav. sand shell base, concrete paving and asphalt surfacing, etc., Galveston Co. $200,000. Plans deposit $25.

LOW BIDDERS

★**Alabama**—W. G. Pruett, dir. State Hy. Dpt., Montgomery, Nov. 20, imprv. road, Calhoun Co., from R. T. Smith Contg. Co., 215 Atlanta Ave., Atlanta, Ga., $449,171; 2.98 mi. Colbert Co., from Foster & Creighton Co., Amer. Natl. Bank Bldg., Nashville, Tenn., $174,881. CD 11/11.

California—State Div. Hys., 808 State Bldg., Los Angeles, Nov. 19, imprv. 0.5 mi. Los Angeles Co., from Griffith Co., Los Angeles Railway Bldg., Los Angeles, $39,838. CD 11/10.

★**Georgia**—State Hy. Dpt., Atlanta, Nov. 25, imprv. road Effingham Co., from Whitley Constr. Co., La Grange, $169,130, est. $148,471***1 mi. Glynn Co., from W. L. Cobb Constr. Co., Decatur, $46,856, est. $36,912 ***7.266 mi. McIntosh Co., from Jack Smith, Hunt Bldg., Atlanta, $221,578, est. $224,093 ***4.637 mi. Rockdale Co., from Lokey & Anderson, Thomson, $114,756, est. $95,135 ***1.731 mi. Telfair Co., from Wainer Constr. Co., Valdosta, $91,301, est. $72,220***6.862 mi. Wheeler Co., from Espy Paving & Constr. Co., 108 E. Bay St. Savannah, $189,793, est. $172,195***3.344 mi. Barrow and Jackson Counties, from North Georgia Constr. Co., Talmo, $60,877, est. $64,511. CD 11/18, 11/20 and 11/23.

Idaho—At office A. C. Merrit, comr. P. Wks., Boise, Nov. 20, imprv. 8.256 mi. Gooding Co. from Hoops Constr. Co., Twin Falls, $490,573. Received no bids imprv. 7.409 mi. Gooding Co. CD 11/13.

Michigan—State Hy. Dpt., Lansing, Nov. 13, imprv. 3.125 mi. DA-WR-17-58C-1, Chippewa Co., from Alpine Excavating Co., Box 337, St. Ignace, $101,454; 2.355 mi. DA-WR-35-24C-1 on M-171 Relocation, Iosco Co., from Bridgeport Core & Sand Co., 125 Davenport Rd., Saginaw, $77,227.

Missouri—State Hy. Comn., Jefferson City, Nov. 21, grading, culverts 1.287 mi. Jackson Co., from Geo Bennett Constr. Co., KCK Food Terminal, Kansas City, Kan., $129,658.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, Nov. 25, imprv. 3,132 ft. Wayne Co., from J. H. Beers, R.D. 2, Bangor, $122,936***335 ft. and 1,033 ft. Wayne Co., from Whittaker & Diehl, Calder Bldg., Harrisburg, $110,257 and $99,965 respectively***2,684 ft. Erie Co., from Baldwin Bros. Paving Co., Union Commerce Bldg., Cleveland, O., $327,484. CD 11/17—ENR 11/19.

Virginia—Dpt. Hys., Richmond, Nov. 24, imprv. 1.5 mi. Washington Co., from Alley Constr. Co., P.O. Box 736, Bristol. $69,282. CD 11/19.

†Va., Arlington—Pub. Roads Admin., North Interior Bldg., Wash., D. C., Nov. 21, access roads, loading platforms for Federal Office Bldg. 2, Proj. VA-DA-NR-39, from Wilmoth Paving Co., 60 P St. S.E., Wash., D. C., $54,902. FWA.

CONTRACTS AWARDED

Arkansas—State Hy. Dpt., Little Rock, 7 mi. and 3 mi. road, Saline Co., to S. M. Dixon, Warren, $31,852 and $32,786 respectively***8.6 mi. Stuttgart, to Pioneer Constr. Co., Malvern, $96,894***1.071 mi. Pulaski Co., to Gregory-Hogan, 115 N. Spring St., Little Rock, $28,405. Grand total $190,027. Bids 11/24, awarded 11/24. CD 11/18.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, paving streets, Monterey Co., to Granite Constr. Co., Watsonville, $50,000-$100,000.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, street paving, Alameda Co., to Independent Constr. Co., Ltd., 46 Ave. Clement St., Oakland. Awarded 11/19.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, grading, paving roads, Duval Co., to James H. Craggs Constr. Co., Ocala, under $50,000.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, concrete paving, Inv.-Neg-F M.-43-9, Lee Co., to C. Fred Culver, Orlando, under $50,000. Awarded 11/10.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, converting open covered walks to encloseds walks, Inv. Neg. B.G.-43-8, Clay Co., to Fred Howland, Inc., 1114 Postal Bldg., Miami, under $50,000. Awarded 11/6.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, roads, Inv. NEG-JAX-43-351, Pinellas Co., to Marion Contg. Co., Ocala, under $50,000. Awarded 11/11.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, converting open covered walks to inclosed walks, Inv. NEG-BG-43-8. Clay Co., to Fred Howland, Inc., Postal Bldg., Miami, under $50,000.

†Kansas—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., gravel and bituminous roads, bldgs., Geary Co. to M. Haase, 2027 Swope Parkway, Kansas City, Mo. Est. $75,000. Howard, Needles, Tammen & Bergendorf, 1012 Orear-Leslie Bldg., Kansas City, Mo., engrs.

†Massachusetts—U. S. Eng., Park Square Bldg., Boston, roads, utilities, No. 175-43-NEG 149, Barnstable Co., to M. De Matteo Constr. Co., 71 Blue Hills Parkway, Milton. Bids 11/23.

★**†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, building, excav., filling furnishing placing culverts and road construction, Wayne Co., to Charles J. Rogers, Inc., 14836 Grand River St., Detroit, less than $1,000,000.

†Mississippi—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, relocating street, Hinds Co., to Clark Bros., Co., Jackson. Est. under $100,000. Bids 10/20. CD 10/16.

†New Jersey—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., excavating, constructing roads, concrete sidewalks, concrete gutters, concrete retaining wall inlets, etc., for housing, WPA. $56,863. D. W. Haining, 930 Atlantic Ave., Atlantic City, WPA engr.

†New York—U. S. Eng., 120 Wall St., New York, road and relocating structures, Richmond Co., to Staten Island Rapid Transit Railway Co., 25 Bway., New York, under $50,000.

★**North Dakota**—State Hy. Dpt., Bismarck, imprv. 13.7 mi. Morton Co., to Bismarck Constr. Co., Bismarck, $126,822***21.97 mi. Benson and Ramsey Counties, also 7.5 mi. Grand Forks Co., to Archie Campbell, Warwick, $269,715 and $129,542 respectively*** structural road imprv., Grand Forks Co., to Rue Constr. Co., Bismarck, $35,827. Grand total $561,906. Bids 11/20. CD 11/11.

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, Tex., grading, asphalt paving, Grady Co., to Oklahoma Bituminous Distribution Co., Ada, $50,000. Awarded 11/18.

†Oregon—U. S. Forestry Service, Portland, road imprvs., Clackamas River Basin, between Estacada and Oak Grove, own forces. $250,000.

†Texas—U. S. Eng., Fort Sam Houston, supplemental contract, addnl. roads, U-V and Z-V-W, Bell Co., to H. B. Zachry, P. O. Box 596, San Antonio, $100,000-$500,000. Additional to 11/16—ENR 11/19 under CA.

†Texas—U. S. Eng., Fort Sam Houston, flexible base course, graveling, etc., Bastrop Co., to H. Page, Georgetown Rd., Austin, under $50,000.

Utah—State Road Comn., Salt Lake City, 33 mi. road, Tooele Co., to J. M. Sumsion, Springville, $115,700. CD 11/16—ENR 11/19.

Utah—State Road Comn., Salt Lake City, grading 3.351 mi. road, Utah Co., to J. W. Whiting Constr. Co., Springville. $24,838.

†Washington—U. S. Eng., 800 3 Ave., Seattle, paving, Kitsap Co., to A. J. Goerig, 305 Lloyd Bldg., Seattle, $100,000-$500,000.

Ont., Brockville—Dpt. Natl. Defense (Army) Ottawa, parade ground surfacing, to M. G. Henniger & Sons, Brockville. $34,000.

Quebec—Dpt. Roads, Quebec City, grading graveling 1.14 mi. road, Cote Croche, Parc des Laurentides, to Delisle & Gagnon, 502 1 Ave., Quebec City. $34,822.

Que., St. Johns — Dpt. National Defense for Air, Ottawa, Ont., road, drainage at No. 9 A.O.S., to P. Bailliargeon, 264 Champlain St., $104,000.

EARTHWORK WATERWAYS

PROPOSED WORK

Tex., Galveston—Galveston Co., c/o Judge, rock groin work, 61 St.

B. C., Vancouver—Municipality, reclamation, development Spanish Banks. $300,000.

B. C., Vancouver—Municipality, seawall, promemade, Stanley Park. $350,000.

BIDS ASKED

Bids Asked December 9

Louisiana—Chas. J. Wyly, secy. Fifth Louisiana Levee Dist., Courthouse, Tallulah, enlarging Reid Bedford to Willow Slough Canal, Madison Parish.

Bids Asked December 24

†California—Bureau Reclamation, Denver, Colo., complete hydraulic gate hoist with accessory equip. and miscellaneous parts and accessory equip. for addnl. hydraulic gate

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EARTHWORK, etc. (Bids Asked, Continued)

hoist to alter and complete hydraulic hoist, etc., Shasta Dam, Kennett Div., Central Valley Project, Spec. 1052.

CONTRACTS AWARDED

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, filling swamp land, Solano Co., to Fredrickson & Watson Constr. Co., 873 81 Ave., Oakland, and Fredrickson Bros., 1259 65 St. Emeryville. Awarded 11/19.

†**Florida**—U. S. Eng., Courthouse and Post Office, Jacksonville, drainage sys., Palm Beach Co., to W. T. Price Dredging Corp., 3200 S.W., 27 Ave., Miami, **$100,000-$500,000.**

La., Shreveport—Comrs. Caddo Levee Dist., 605 Courthouse, imprv. land side borrow Pit Twelve Mile Bayou Levee Cash Point to Dixie Blanchard Rd., culverts and control gates Dixie Blanchard Rd., constructing Cash Point Culverts and floodgates, all Twelve Mile Bayou Levee and Drainage Sys., to R. F. Henry, Dubach, **$34,498.** Bids 11/12, awarded 11/25. CD 11/6—ENR 11/12.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, earthen and concrete dam, road, Bowie Co., to W. C. Crawford, 4817 Montrose St., Dallas, **$50,000-$100,000.** Bids 11/9. CD 10/29.

UNCLASSIFIED

PROPOSED WORK

★ †**Alabama**—IMPROVEMENTS—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, imprvs., Pike Co. $750,000. CAA.

†**California** — IMPROVEMENTS — Bd. Supervs. Los Angeles Co., Hall of Records, Los Angeles, will hold hearing Dec. 15, imprvs. CAA made $770,000 available if county acquires site.

†**California** — SITE GRADING, etc. — Alameda Housing Auth., 1711 2 St., Alameda, bids soon rough grade and fill in connection with construction housing units, on 2 sites, Cal-4113 and Cal-4114, for NHA. A. T. Hass, 525 Market St., San Francisco, and C. I. Warnecke, 1700 Financial Center Bldg., Oakland, archts. G. E. Atkins, Hobart Bldg., San Francisco, mechanical engr.

†**Idaho**—IMPROVEMENTS, etc.—U. S. Eng., Pittock Blk., Portland, Ore., imprvs., bldgs., WW sys., etc. Elmore Co.

★ †**Ill., Aurora** — IMPROVEMENTS — City, D. D. Ricker, clk., imprvs. $1,200,000. CAA.

Ill., Sterling—IMPROVEMENTS—Defeated $200,000 bonds, imprvs. CD 10/14—ENR 10/22.

Ia., Oelwein—STREET LIGHTING—Interstate Power Co., F. C. Lynes, dist. mgr., Oelwein, street lighting, 105 standards. $25,000.

Ia., Sioux City—STADIUMS—Bd. Educ., 2 rein.-con. stadiums. $35,000.

★ †**Kansas**—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., Seward Co. $3,000,000.

Louisiana—GAS PIPE LINE—Southern Gas Line, Inc., Monroe, 8 in. gas pipe lines near Lamourie, Moreland and Inglewood, Rapides Parish.

Louisiana — OIL PIPELINES — Texas Co., 919 St. Charles St., New Orleans, two 3 in. oil pipelines, Jefferson Parish.

Louisiana — OIL PIPELINE — Texas Pipe Line Co., Texas Co. Bldg., Houston, Tex., oil pipeline, Calcasieu Parish.

★ **La., Donaldsonville** — IMPROVEMENTS — City, G. R. Blum, mayor, $80,000 bond election Dec. 15, imprvs. $1,000,000.

La., Golden Meadow — WHARF — Morgan City Packing Co., Houma, 30x50 ft. covered timber wharf, timber pile fdn.

Minnesota—AIR RAID SIGNALS—State, E. A. Walsh, state adjutant, St. Paul, and local communities, making surveys air raid signals in Minneapolis, St. Paul, Duluth, et al. $150,000.

Minn., New Ulm—IMPROVEMENTS—A. C. Sannwald, city clk., bond election Jan. 18, imprvs. $50,000-$75,000.

Minn., University (Sta. Minneapolis)—IMPROVEMENTS—American Aviation, Inc., K. Osterberg, University Airport, imprvs. $25,000.

†**Miss., Greenwood** — IMPROVEMENTS — City, imprvs., surfacing, constructing paving and lighting. CAA.

†**Nevada**—GASOLINE FUELING SYSTEM—U. S. Eng., 4792 Sepulveda Ave., San Bernardino, Calif., indefinitely postponed bids, to have been opened Nov. 30, a.f. gasoline fueling sys. Nev. Solic. 954, Clark Co. CD 11/23.

N. M., Malaga—OIL WELLS—Payton Bros., Carlsbad, drilling, developing 2 deep test oil wells.

N. M., Pinon—OIL WELLS—Hunt Oil Co., Alamogordo, drilling deep test wells.

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UNCLASSIFIED (Proposed Work, Cont'd.)

†**Oklahoma**—COMPASS SWINGING BASE—U. S. Eng., 416 Wright Bldg., Tulsa, compass swinging base, Oklahoma Co. $25,000.

†**Tenn., Jackson** — IMPROVEMENTS — City, A. B. Foust, mayor, imprvs. Federally financed. Freeland-Roberts & Co., 3rd Natl. Bank Bldg., Nashville, engr.

Tenn., Memphis—IMPROVEMENTS—Chicago & Southern Airlines, Municipal Airport, imprvs. About $50,000.

†**Texas** — COMPASS SWINGING BASE — U. S. Eng., 25 St. and Avenue F, Galveston, compass swinging base, Howard Co. $30,000.

†**Texas** — ELECTRICAL DISTRIBUTION, etc.—U. S. Eng., 25 St. and Avenue F, Galveston, outside electrical distr. sys., over $25,000; water, sanitary sewer, and gas lines, area grading, Matagorda Co.

†**Texas**—FACILITIES—U. S. Eng., Fort Sam Houston, facilities, Bexar Co. $40,000 authorized.

★†**Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, Imprvs., Bell Co. $800,000 authorized.

†**Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., bldg., etc., Bexar Co. $50,000.

Texas—OIL WELLS—H. S. Boyle, Union Natl. Bldg., Houston, drilling, casing, developing 3 deep test oil wells, two 4,000 ft. deep, Harris Co. and one 6,000 ft. deep, Jackson Co. Over $25,000.

†**Texas** — STORAGE FACILITIES — U. S. Eng., Albuquerque, N. M., storage facilities, El Paso Co. $45,000 authorized.

Tex., Abilene—OIL WELL—Condor Petroleum Corp., Abilene, drilling 3,000 ft. deep test oil well and developing. No. 1. J. T. Warren estate. Over $25,000.

Tex., Douglassville — OIL WELL — Phillips Petroleum Co., Bartlesville, Okla., drilling campaign for deep test oil well, Kildaire area. $100,000.

Tex., Freer—OIL WELL—Taylor Refining Co., San Diego, drilling, casing, developing 8,000 ft. deep test oil well, Stake 2, E E Cadena. $60,000.

Tex., Guerra—OIL WELL—Sun Oil Co., Corpus Christi, 5,500 ft. deep test oil well, No. A-2, T. T. east. $50,000.

Tex., Hebbronville — OIL WELL — Sun Oil Co., Corpus Christi, drilling, casing, developing 5,500 ft. deep test oil well, No. 6, A. L. east survey. Over $25,000.

Tex., Houston — IMPROVEMENTS — City, C. A. Pickett, mayor, will not construct imprvs. Project abandoned. M. McGinty, 2017 W. Gray St., engr. CD 11/5—ENR 11/12 under LB.

Tex., Jean—OIL WELLS—Mudge Oil Co., Gulf States Bldg., Dallas, drilling, casing, developing two 4,800 ft. deep test oil wells, Knox Field 8. Over $25,000.

Tex., Karnes City—OIL WELL—H. Coquat, Dan Auld, W. W. Carter, Karnes City, 7,500 ft. deep test oil well, near here, No. 1 A L Schorre, in C. Martinez grant. Over $25,000.

Tex., Kenedy—OIL WELL—Philips Petroleum Co., Karnes City and Kenedy, 9,000 ft. deep test oil well, near here, C. Martinez Grant. $75,000.

Tex., La Gloria — OIL WELL — S. E. Wilson, et al., Alice, oil well development (No. 1 Marie S de Garza). $60,000 or more.

Tex., Merkel—OIL WELL—Condor Petroleum Corp., Abilene, addnl. drilling, developing deep test oil wells. J. T. Warren, et al surveys. Over $25,000.

Tex., Mineral Wells — IMPROVEMENTS — W. L. Campbell, Mineral Wells, c/o Old Municipal Airport, imprvs. Over $25,000.

Tex., Navidad—OIL WELL—G. L. Warren, Edna, drilling, casing, developing deep test oil well, near here, No. 1 Camille Smith. Over $25,000.

Tex., Oakville—OIL WELL—Continental Oil Co., George West, oil well development, Blk. 65, Survey 35. Over $25,000.

★†**Tex., Palacios**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs. Over $1,000,000.

★†**Tex., Pampa**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., expansion imprvs. Over $1,000,000.

Tex., Realitos — OIL WELL — Ogden & Voyles, Laredo, drilling, developing 2,000 ft. oil well, near here, Kohler Field, Survey 3. Over $25,000.

Tex., Runge—OIL WELL—American Liberty Oil Co., Magnolia Bldg., Dallas, drilling, casing, developing 7,600 ft. deep test oil well, near here, No. 1-W. Otton Von Roeder of J. Johnson survey. Over $25,000.

Tex., San Miguel—OIL WELL—Baldridge & King, McAllen, 6,000 ft. deep test oil well, Share 25-B, Santa Cruz Grant. Over $25,000.

Tex., Waskom—OIL WELLS—Midstates Oil Corp., Marshall, drilling, casing, developing deep test oil wells, Jno. Harrison Survey. Over $25,000.

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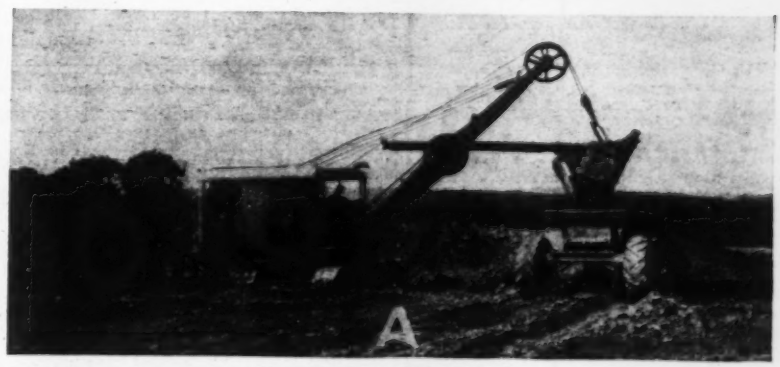

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UNCLASSIFIED (Proposed Work, Continued)

Tex., Waxahachie — OIL WELLS — T. B. Stoddard, Waxahachie, drilling, casing, developing deep test wildcat oil wells, near here. Over $100,000.

Tex., Windthorst—OIL WELL—Shell Oil Co., Wichita Falls, 3,250 ft. rotary test oil well, No. I, M. L. Henderson. Over $25,000.

Wis., West Bend — IMPROVEMENTS — K. Weiss, city clk., making surveys imprvs.

★**†Alta., Vermilion**—OIL WELLS—Canadian National Ry., H. A. Dixon, ch. engr., 360 McGill St., Montreal, Que., drilling 50 oil wells. $500,000.

B. C., Vancouver — PARK — Municipality, beautification Queen Elizabeth Park on Little Mountain, possible construction sport stadium. $250,000.

N. S., Yarmouth—IMPROVEMENTS—Dominion Govt., Ottawa, Ont., plans by Dpt. Natl. Defense for Air, Lisgar Bldg., Ottawa, Ont., imprvs., frame bldgs., concrete fdns. $170,000.

Yukon Territories and **Alaska**—RAILWAY—Skagway-Whitehorse R. R., Whitehorse, Yukon Territory, exten. railway from Whitehorse, Yukon Territory, to Fairbanks, Alaska.

BIDS ASKED

Bids Asked December 7

†New Jersey — IMPROVEMENTS — Curtis Wright Mfg. Co., Caldwell ,imprvs. Defense Plant Corp. will finance. Haller Engr. Associates, c/o Curtis Wright Mfg. Co., Caldwell engrs.

Bids Asked December 8

Man., Virden—IMPROVEMENTS—Secretary Dpt. Munitions & Supply, Ottawa, Ont., imprvs., N.C.O.'s quarters, recreational hall, imprvs., etc., E. F. T. School, for Dpt. National Defense for Air, Ottawa, Ont. $200,000.

Nova Scotia — IMPROVEMENTS—Secretary Dpt. Munitions & Supply, Ottawa, Ont., imprvs., bldgs., for Dominion Govt., Ottawa, Ont. $150,000. Dpt. Natl. Defense for Air, Lisgar Bldg., Ottawa, Ont., archts.

Bids Asked December 11

N. Y., New York—TRACK WORK—Bd. Transportation, 250 Hudson St., track special work, track layout. Bid 18639.

Bids Asked About December 12

†Texas — ELECTRICAL DISTRIBUTION — U. S. Eng., 231 W. Main St., Denison, outside electrical distr. sys., Smith Co. Over $25,000. Plans deposit $50.

Bids Asked After December 16

†Okla., Okmulgee—IMPROVEMENTS—Dpt. Commerce, Civil Aeronautics Admin., Box 1689, Fort Worth, Tex., imprvs., near here, Bid 443-1940.

Bids Asked About January 1

†Ky., Covington — IMPROVEMENTS—Civil Aeronautics Admin., 608 S. Dearborn St., Chicago, Ill., imprvs.

†Minn., Alexandria — IMPROVEMENTS — Civil Aeronautics Admin., 608 S. Dearborn St., Chicago, Ill., imprvs. CD 10/27—ENR 10/29.

Bids Asked February 15

†Missouri — IMPROVEMENTS — Civil Aeronautics Admin., City Hall, Kansas City, Mo., imprvs., Livingston Co. CD 11/10—ENR 11/12.

Bids Asked

Mo., Grandview—IMPROVEMENTS—City of Kansas City, Mo., c/o A. Cookingham, mgr., City Hall, Kansas City, Mo., electrical equip for imprvs. CAA. R. McKinley, City Hall, engr.

†Oklahoma—ELECTRICAL FIRE ALARM SYSTEM, etc.—U. S. Eng., 231 W. Main St., Denison, Tex., electrical fire alarm sys. and automatic sprinkler sys., facilities, Jackson Co. Over $25,000. Plans deposit $50.

★**†Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., bldgs., Matagorda Co. $1,800,000. Plans deposit $100.

†Texas—CONSTRUCTION—U. S. Eng., 231 W. Main St., Denison, addnl. construction, bldgs., gasoline and fuel stations, oil houses, oil and grease racks, etc., Solic. 257-43-140, Lamar Co. $100,000. Plans deposit $50.

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, outside electrical distr. sys., for apartments and dormitories, $100,000 plans deposit $50; all dirt work, grading, building, roads streets, etc., $450,000, plans deposit $50. H. F. Kuehne, B. F. Giesecke, R. M. Brooks, Littlefield Bldg., Austin, engrs.

†Texas—ELECTRIC FIRE ALARM SYSTEM, etc.—U. S. Eng., 231 W. Main St., Denison, electric fire alarm sys. and automatic sprinkler sys., facilities, Hunt Co. Plans deposit $50.

†Texas—FIRE ALARM SYSTEM—U. S. Eng., 231 W. Main St., Denison, electric fire alarm sys. and automatic sprinkler sys., facilities, for bldg. area, Gray Co. Over $25,000. Plans deposit $50.

†Texas—FIRE ALARM SYSTEM, etc.—U. S. Eng., 231 W. Main St., Denison, electrical fire alarm sys., automatic sprinkler sys., facilities, Childress Co. Over $25,000. Plans deposit $50.

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., $50,000; plans deposit $25; a.c. fueling sys., $45,000, bonds, Matagorda Co.

Tex., Odessa—OIL WELL—R. Lee, San Angelo drilling, developing 5,000 ft. deep test oil well, C SW SW 2-42-4'8-7 & P. Over $25,000.

LOW BIDDERS

★**†Arkansas**—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., imprvs., Garland Co., from R. B. Potashnik, 1347 N. Pacific St., Cape Girardeau, Mo., under $1,000,000. CD 10/20—ENR 10/22.

†California—GAS FUELING SYSTEM—U. S. Eng., 1209 8 St., Sacramento, Nov. 19, gas fueling sys., Spec. 239, Sacramento Co., from Luppen & Hawley, Inc., 3126 J St., Sacramento, less than $50,000.

†California — GASOLINE SYSTEM — U. S. Eng., Wright Bldg., Sacramento, a.c. gasoline sys., Spec. 294, Sacramento Co., from Flotation Systems, Inc., 4031 Goodwin Ave., Los Angeles, under $50,000.

†Louisiana—IMPROVEMENTS—U. S. Eng., foot of Prytania St., New Orleans, Nov. 20, imprvs., roads, drainage ditches, Inv. 43-178, from A. C. Campbell Constr. Co., 86 Crockett St., Shreveport. CD 11/16.

†California—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Nov. 18, imprvs., bldgs., Sol. 944, from W. C. Beggs, 610 S. Bway., Los Angeles, less than $500,000; imprvs., bldgs., Sol. 953, from J & B Constr. Co., 5572 Valley Blvd., Los Angeles, less than $100,000, both Los Angeles Co.

†California—IMPROVEMENTS—U. S. Eng., Wright Bldg., Sacramento, imprvs., utilities, etc., Tulare Co., from J. E. Haddock Ltd., 355 E. Foothill Blvd., Pasadena, $100,000-$500,000. CD 11/23.

†California—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Nov. 18, imprvs., Sol. 948, Ventura Co., from Brown, Doko & Baun, Pismo Beach, over $100,000.

†South Carolina — GASOLINE STORAGE SYSTEM—U. S. Eng., Myrtle Beach, Nov. 12, a.c. gasoline storage sys., Horry Co., from R. G. Greene Plumbing & Heating Co., Myrtle Beach.

†South Carolina—GASOLINE and OIL STORAGE—U. S. Eng., 33 Customhouse, Charleston, No. 20, a.c. gasoline and oil storage distr. sys., Proj. 649 377, Florence Co., from A. Z. Price & Co., Inc., Piedmont Bl., Charlotte, N. C.

†South Carolina—GASOLINE and OIL STORAGE SYSTEM—U. S. Eng., Congaree, Nov. 21, a.c. gasoline and oil storage distr. sys., Richland Co., from Boyle Constr. Co., Sumter.

†South Carolina—IMPROVEMENTS—U. S. Eng., Congaree, Nov. 19, imprvs., Sumter Co., from M. B. Kahn Constr. Co., 714 Lady St., Columbia.

†Texas—ELECTRIC DISTRIBUTION SYSTEM—Pub. Housing Auth., NHA, Electric Bldg., Fort Worth, outside electric distr. sys. for housing, Project Tex 41-332, from J. M. Thurman, P. O. Box 998, Phillips, under $50,000. CD 11/5—ENR 11/12.

†Texas—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, Nov. 21, imprvs., grading, concrete and asphalt paving, etc., Galveston Co., from C. O. Beeler, 7302 Kernel St., Houston. CD 11/16.

†Texas—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., Maverick Co., from C. A. Fuess, 20½ Highland Park Village, Dallas, under $50,000. CD 11/12—ENR 11/19.

CONTRACTS AWARDED

†Alabama—ELECTRICAL DISTRIBUTION—U. S. Eng., Gadsden, electrical distr. sys., Etowah Co., to Rogers Electric Co., 4613 10 Ave. N., Birmingham. Est. $75,000. Bids 11/17.

†Alabama—ELECTRICAL DISTRIBUTION—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., construction, completion electrical distr. sys., Talladega Co., to Miami Beach Electric Co., Atlanta, Ga., under $50,000.

★**†Alabama**—IMPROVEMENTS—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, addnl. imprvs., bldgs., Jefferson Co., to N. C. Morgan Constr. Co., Tuscaloosa. $500,000. CD 10/15—ENR 10/22.

†California—ELECTRICAL DISTRIBUTION—U. S. Eng., 751 S. Figueroa St., Los Angeles, electrical distr. Sol. 939, San Bernardino Co., to Stolper Electric Corp., 148 E. San Fernando Blvd., Burbank, under $50,000. Bids 11/21.

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**California**—FIRE and WATER DISTRIBUTION SYSTEM—U. S. Eng., 74 New Montgomery St., San Francisco, fire and water distr. sys., Solano Co., to Henry Ernst & Sons, 551 Hayes St., San Francisco, **$50,000-$100,000.**

†**California**—GASOLINE FACILITIES—U. S. Eng., 74 New Montgomery St., San Francisco, addnl. gasoline facilities, Marin Co., to Central California Constr. Co., Inc., 115 Burrows St., San Francisco, under **$50,000.**

†**California** — IMPROVEMENTS — Industrial Company, imprvs., bldg. addn., Contra Costa Co., to H. H. Larsen Co., 64 South Park St., San Francisco. Federally financed.

†**California**—IMPROVEMENTS—U. S. Eng., 1209 8 St., Sacramento, imprvs., Spec. 253, Butte Co., to Campbell Constr. Co., 800 R St., Sacramento. Est. under **$50,000.** Bids 11/16. CD 11/12.

†**California**—RAILROAD SPUR—U. S. Eng., 72 S. Figueroa St., Los Angeles, railroad spur, Riverside Co., to Shannahan Bros., 6193 Maywood Ave., Huntington Park, over **$50,000.** Awarded 11/21.

†**California**—SITE GRADING, etc.—Benicia Housing Auth., Box 213, Benicia, site grading, paving work in connection with housing, Proj. 4019-441, Solano Co., for NHA, to C. Dudley de Velbiss Co., Hotel Oakland, Oakland, **$115,350.**

Calif., San Francisco—PIER—General Eng. & Drydock Co., Filbert and Sansome Sts., altering Pier 25, Battery and Lombard Sts., to Younger Constr. Co., Cheda Bldg., San Anselmo. CD 11/17—ENR 11/19, under LB.

†**Connecticut** — IMPROVEMENTS — U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., imprvs., New London Co., to Alexander Jarvis Co., Center St., Manchester. Est. **$100,000-$500,000.**

†**Florida**—IMPROVEMENTS—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., imprvs., Inv. 310, Bay Co., to I. W. Bryan Co., Panama City, under **$150,000.**

†**Florida**—CLEARING, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, Inv. Neg-C.C.-43-2, Dixie Co., to C. K. McKaskill Jr., Gainesville, under **$50,000.** Awarded 11/7.

†**Florida**—CLEARING, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, grading, draining, mucking, etc., Polk Co. to James H. Craggs Constr. Co. and B. B. McCormick & Sons, Inc., Graham Bldg., Jacksonville, **$100,000-$500,000.**

†**Florida** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, electrical distr. sys., Inv. Neg-Jax 43-370, Pinellas Co., to Bigby Electric Co., 305 Franklin St., Tampa, under **$50,000.** Awarded 11/11.

†**Florida**—GASOLINE DISTRIBUTION SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, gasoline distr. sys., Inv. NEG-JAX-43-354, Hillsborough Co., to Langston Constr. Co., Orlando, under **$50,000.**

†**Florida** — GASOLINE STORAGE, etc. — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, gasoline storage and fueling facilities, Inv. Neg-D.F.-43-6, Hillsborough Co., to Ryan Constr. Co., 416 Tampa St., Tampa, under **$50,000.** Awarded 11/5.

†**Florida**—GASOLINE STORAGE and FUELING FACILITIES—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, gasoline storage and fueling facilities, Highland Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., under **$50,000.**

†**Florida**—HEATING EXTENSIONS, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, heating and exten. steam distr. sys., Inv.-Neg-M.D.-43-11, Hillsborough Co., to Ford Plumbing Co., 3807 Florida Ave., Tampa, under **$50,000;** automatic sprinkler sys., Inv. NEG-JAX-43-343, Hillsborough Co., to Moore Pipe & Sprinkler Co., 1130 W. State St., Jacksonville, under **$50,000.** Awarded 11/6 and 11/9 respectively.

†**Florida** — IMPROVEMENTS, etc. — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, imprvs., clearing, grading, grubbing, paving, Highlands Co., to G. A. Hanson Co., Inc., 1312 1st Natl. Bank Bldg., Tampa, **$50,000-$100,000.**

†**Florida**—PLANTING, etc.—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, furnishing, planting, mucking, watering and fertilizing trees and shrubs, Palm Beach Co., to Island Landscape Co. Inc., 309 S. County Rd., West Palm Beach, under **$50,000.**

†**Florida** — POWER PANELS — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, installing power panels for electrical distr., Inv. NEG-B.R.-43-11, Palm Beach Co., to Tarpon Electric Co., St. Petersburg, under **$50,000.** Awarded 11/7.

†**Florida** — SPRINKLER SYSTEM — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, exten. sprinkler sys., Inv. NEG-JAX-43-364, Orange Co., to Moore Pipe & Sprinkler Co., 1130 W. State St., Jacksonville, under **$50,000.** Awarded 11/13.

†**Florida**—SPRINKLER SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, sprinkler sys., Inv-NEG-Jax-43-340, Jackson Co., to Moore Pipe & Sprinkler Co., 1130 W. State St., Jacksonville, under **$50,000.** Awarded 11/10.

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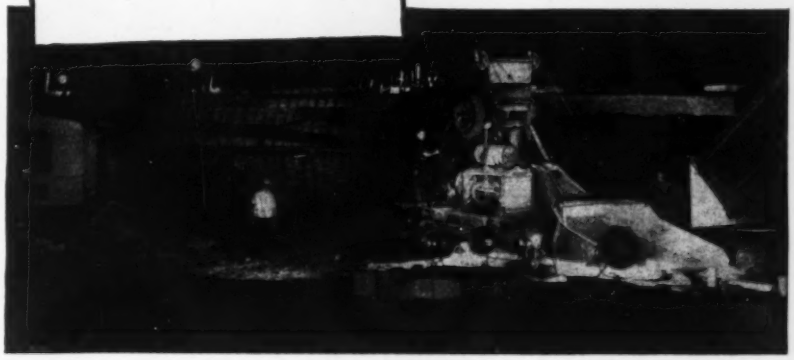

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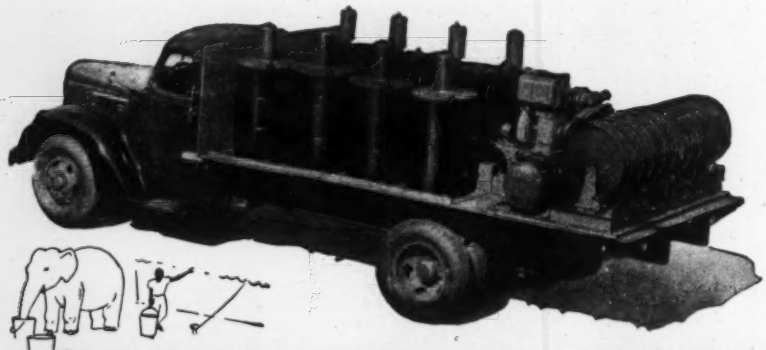

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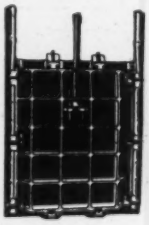

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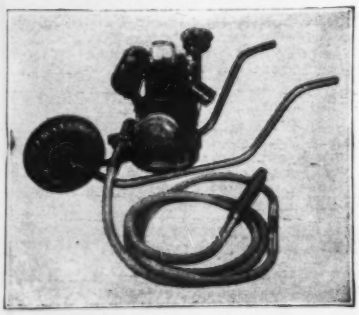

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**Florida** — STEAM DISTRIBUTION SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, Custom-house, exten. steam distr. sys., Inv. 43-361, Orange Co., to Walter [illegible] Son, Inc., Duval Bldg., Jacksonville, under $50,000. Awarded 11/12.

†**Georgia** — CLEARING, etc. — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, grading, Inv. [illegible]-JAX-43-348, Lowndes Co., to J. N. Bray, Valdosta, under $50,000; inclosing wall, [illegible] Inv. NEG-VA-43-14, Lowndes Co., to [illegible] Investment Co., Valdosta, under $50,000.

†**Georgia** — GASOLINE STORAGE, etc. — U. S. Eng., Post Office Bldg., Savannah, gasoline storage and dispensing sys., Liberty Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., under $50,000.

†**Illinois**—GASOLINE FUELING SYSTEM—U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, enlarging a.c. gasoline fueling sys., Negotiation No. 1103-43-87, St. Clair Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. Est. under $50,000. Bids 11/14. CD 11/6.

†**Illinois**—HEATING, etc.—U. S. Eng., 520 Merchandise Mart, Chicago, heating and ventilating, Cook Co., to Mehring & Hanson Co., 162 N. Clinton St., Chicago, under $50,000.

†**Indiana**—GASOLINE FUELING SYSTEM—U. S. Eng., Federal Bldg., Louisville, Ky., gasoline fueling sys., Marion Co., to Walters Constr. Co., Inc., 37-49 58 St., Woodside, N. Y., under $50,000.

†**Indiana**—GASOLINE FUELING SYSTEM—U. S. Eng., Federal Bldg., Louisville, Ky., gasoline fueling sys., Bartholomew Co., to Walters Constr. Co., Inc., 37-49 58 St., Woodside, N. Y., under $50,000.

†**Kansas**—GRADING—U. S. Eng., 10 E. 17 St., Kansas City, Mo., grading, Saline Co., to M. W. Watson, Topeka Bldg., Topeka, $100,000-$500,000.

†**Louisiana** — GASOLINE FUELING SYSTEM—U. S. Eng., foot of Prytania St., New Orleans, a.c. gasoline fueling sys. addn., Inv. 43-171, to William F. Kelly Co., 134 Carondelet St., New Orleans. Est. about $50,000. Bids 11/13. CD 11/10.

†**Maine**—CONSTRUCTION—U. S. Eng., Park Square Bldg., Boston, Mass., concrete construction work, No. 175-43-NEG 150, Cumberland Co., to Brown Constr. Co., 562 Congress St., Portland. Est. over $25,000. CD 11/19—ENR 11/26, under BA.

†**Massachusetts**—ELECTRICAL DISTRIBUTION—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., electrical distr. and lighting sys., Hampden Co., to Collins Electric Co., 211 Worthington St., Springfield. Est. under $50,000.

†**Massachusetts**—FACILITIES—U. S. Eng., 31 St. James Ave., Boston, facilities, Barnstable Co., to F. Grande & Son Constr. Co., 425 Bway., Everett, under $50,000.

†**Massachusetts** — IMPROVEMENTS — U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., imprvs., grading, drainage, Bristol Co., to Guerini Constr. Co., Inc., 524 River St., Dorchester. Est. $100,000-$500,000.

★†**Michigan** — GASOLINE FUELING SYSTEM—U. S. Eng., 700 Union Guardian Bldg., Detroit, a.c. gasoline fueling sys., Washtenaw Co., to H. B. Culbertson Co., 2842 W. Grand Blvd., Detroit, less than $1,000,000.

†**Michigan** — LIGHTING SYSTEM — U. S. Eng., 520 Merchandise Mart, Chicago, Ill., construction, completion lighting sys., Calhoun Co., to Super Electric Constr. Co., 1442 S. Racine St., Chicago, Ill., under $50,000.

★†**Michigan**—POWER and LIGHTING SYSTEM—U. S. Eng., 700 Union Guardian Bldg., Detroit, power, control and lighting sys., Chippewa Co., to Harlan Electric Co., 3139 Hamilton St., Detroit, less than $1,000,000.

†**Mississippi**—GASOLINE FUELING SYSTEM—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, gasoline fueling sys., addns., Hinds Co., to Campbell & Johnson, 777 Commerce St., Jackson, under $50,000.

†**Mississippi**—FIRE ALARM SYSTEM—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, automatic fire alarm sys., Panola Co., to American District Telegraph Co., Western Union Bldg., Memphis, Tenn. Est. under $50,000.

†**Mississippi**—IMPROVEMENTS—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., imprvs., Lowndes Co., to Newton & Glenn, Hattiesburg, $50,000-$100,000. Awarded 11/24.

†**Missouri**—FIRE ALARM SYSTEMS—U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, installing 2 zone non-coded automatic and manual fire alarm sys. in 10 bldgs., Negotiation 1103-43-90, Ste. Genevieve Co., to American District Telegraph Co., 910 Chestnut St., St. Louis. Est. under $50,000. Bids 11/12.

†**Missouri** — GASOLINE STORAGE, etc. — U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, installing gasoline storage tank and 2 centrifugal pumps, furnishing, installing 10 dispensing units, air compressor, etc., Negotiation No. 1103-43-91, St. Louis Co., to Neumayer Equipment Co., Inc., 723 S. Sarah St., St. Louis. Est. under $50,000. Bids 11/12.

UNCLASSIFIED, etc. (Contracts Awarded, Continued)

†**Missouri** — SPRINKLER SYSTEM — U. S. Eng., 400 U. S. Court House & Custom House, St. Louis, automatic wet pipe sprinkler sys. in 19 bldgs., and enclosed walkways and automatic dry pipe sys. in 3 bldgs., Negotiation No. 1102-42-92, St. Louis Co., to Grinnell Co., Inc., 1140 Central Industrial Dr., St. Louis, under **$50,000.**

†**Nebraska**—COMPASS SWING BASE—U. S. Eng., 1709 Jackson St., Omaha, compass swing base, Lancaster Co., to Abel Constr. Co., 900 N. 16 St., Lincoln, under **$50,000.**

†**Nebraska** — GRADING, etc. — U. S. Eng., 1709 Jackson St., Omaha, grading, seeding, Box Butte Co., to A. C. Ross, Bayard, under **$50,000.**

†**Neb., Beatrice** — IMPROVEMENTS — City, grading, excavating for imprvs., to Roberts Constr. Co., 1018 Term. Bldg., Lincoln, **$41,000.** CAA.

†**New Jersey** — IMPROVEMENTS — U. S. Eng., 120 Wall St., New York, N. Y., imprvs., Essex Co., to Hansen-Jensen Co., Inc., 337 N. Broad St., Elizabeth, **$50,000.**

†**New Jersey**—FIRE STATIONS—U. S. Eng., 120 Wall St., New York, N. Y., fire stations, incl. water, electrical distr. sys., roads, drains and track work, Middlesex Co., to Gamina Bldg. & Contg. Co., 14 George Rd., New Brunswick, **$50,000-$100,000.** Bids 11/19. CD 11/17.

★†**New Mexico**—IMPROVEMENTS—U. S. Eng., Albuquerque, imprvs., Lea Co., imprvs. Lea Co. to Harco Constr. Co., G. Kies and Waco Constr Co., Waco, Tex., less than **$1,000,000*****addnl. bldgs., to E. S. McKittrick Co. Inc., Carlsbad, less than **$200,000;** addnl. bldgs., to Jim Handley Inc., San Antonio, Tex., less than **$200,000.** Awarded 11/25.

†**New Mexico** — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., bldgs., Otero Co., to M. M. Sundt Constr. Co., Las Vegas, under **$100,000.** Awarded 11/25.

N. M., Hobbs—OIL WELLS—Carper Drilling Co., Hobbs, drilling, developing deep test oil wells, force account. Over **$40,000.**

†**New York**—IMPROVEMENTS—U. S. Eng., 960 Ellicott Square Bldg., Buffalo, imprvs., Erie Co., to A. Friederich & Sons Co., 710 Lake Ave., Rochester, **$100,000-$500,000.**

†**New York**—IMPROVEMENTS—U. S. Eng., 120 Wall St., New York, imprvs., Nassau Co., to William P. McDonald Constr. Co., 33-15 Lawrence St., Flushing, and Good Roads Engineering & Contg. Co., Inc., Burns Ave., Wantagh, **$100,000-$500,000.** CD 8/10.

†**New York**—REMOVING OBSTRUCTIONS—U. S. Eng., 960 Ellicott Square Bldg., Buffalo, removing obstructions, Jefferson Co., to Barber Electric Co., Inc., 210 State St., Watertown, under **$50,000.**

†**New York**—WHARF—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., concrete, timber wharf, to Merritt-Chapman & Scott Corp., 292 Pequot Ave., New London, Conn. Est. **$50,000-$100,000.** Bids 11/19. CD 11/17.

†**North Carolina**—IMPROVEMENTS—U. S. Eng., 308 Customhouse, Wilmington, imprvs., Wayne Co., to W. L. Jewell, Sanford.

†**N. C., Fayetteville**—COMFORT STATIONS—Federal Works Agency, 606 State Planters Bldg., Richmond, Va., 3 comfort stations, to Parham & Darr Co., High Point. Bids 11/12.

†**Ohio** — RAILROAD FACILITIES — U. S. Eng., U. S. Post Office & Courthouse, Cincinnati, addnl. railroad facilities, etc., Franklin Co., to W. A. Gurtler & Co., Chicago, Ill. **$100,000-$500,000.**

†**Oklahoma**—ELECTRICAL SYSTEM—U. S. Eng., 231 W. Main St., Denison, Tex., outside night-lighting electrical distr. sys., Bryan Co., to L. W. Drummond, Ada, under **$50,000.**

†**Oklahoma**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, imprvs., Tillman Co., to P. B. Odom Co., 3621 N.W. 10 St., Oklahoma City, over **$100,000.** Awarded 11/19. CD 11/11—ENR 11/19.

†**Oklahoma**—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, Tex., imprvs., paving, Bryan Co., to Hargrave Constr. Co., 2424 Bever St. S.E., Cedar Rapids, Ia. Total est. under **$500,000.** CD 10/19—ENR 10/22.

†**Oregon**—SPUR RAIL LINE—U. S. Eng., Pittock Blk., Portland, spur rail line, Deschutes Co., to Natt McDougall & Co., Sherlock Bldg., Portland.

†**Ore., Scappoose**—IMPROVEMENTS — Civil Aeronautics Admin., Boeing Field, Seattle, Wash., imprvs., clearing, draining, conditioning, fencing, etc., to P. W. Yett, 3525 N.E. 17 St., Portland, **$150,456.** Bids 11/25, awarded 11/24. CD 11/20.

Pa., Pittsburgh—RAILROAD TRACK—Carnegie-Illinois Steel Co., W. M. Reed, ch. engr., Carnegie Bldg., relocating railroad trackage, approx. 5 mi. new track, grading, abutments, to Booth & Flinn, 1942 Forbes St.

†**South Carolina** — GASOLINE SYSTEM — U. S. Eng., Walterboro, a.c. gasoline sys., Colleton Co., to Williams Bros., Forsythe Bldg., Atlanta. Bids 11/13.

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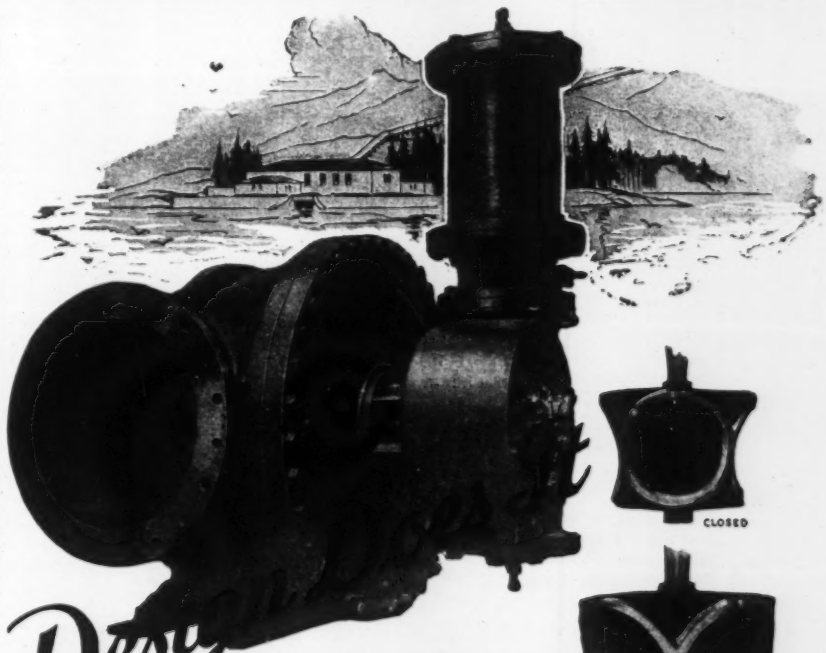

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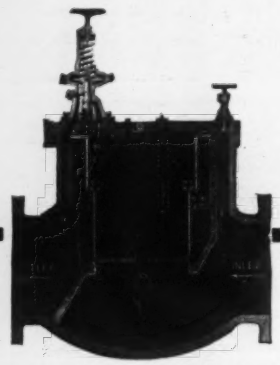

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UNCLASSIFIED, etc. (Contracts Awarded, Continued)

†**South Carolina**—PLUMBING FACILITIES—U. S. Eng., 33 Customhouse, Charleston, plumbing facilities, Charleston Co., to W. K. Prause, 178 King St., Charleston, under **$50,000.**

†**South Carolina**—GASOLINE DISPENSING SYSTEM—U. S. Eng., 33 Customhouse, Charleston, gasoline dispensing sys., Greenville Co., to A. Z. Price Co., Inc., Piedmont Bldg., Charlotte, N. C. **$50,000-$100,000.**

†**South Carolina** — GASOLINE STORAGE SYSTEM, etc.—U. S. Eng., Post Office Bldg., Savannah, Ga., gasoline storage and dispensing sys., Aiken Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. under **$50,000.**

†**South Carolina**—GASOLINE SYSTEM—U. S. Eng., Fort Jackson, a.c. gasoline sys., Lexington Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y.

†**Tennessee**—IMPROVEMENTS—U. S. Eng., P. O. Box 97, Memphis, imprvs., Shelby Co., to Lee Constr. Co., 1467 Lamar St., Memphis. Est. **$100,000.** Bids 11/7. CD 11/25.

†**Tennessee**—FENCES—U. S. Eng., 306 U. S. Courthouse, Nashville, fences, Coffee Co., to B & H Constr. Co., Nashville, under **$50,000.**

†**Tennessee**—GASOLINE FUELING SYSTEM—U. S. Eng., P. O. Box 97, Memphis, construction, completion gasoline fueling sys., Shelby Co., to Lee Constr. Co., 1467 Lamar Ave., Memphis, **$50,000-$100,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., Lubbock Co., to W. L. Dinson, Albuquerque, N. M., **$50,000-$100,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., bldgs., Val Verde Co., to J. W. Bateson, Del Rio, over **$100,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., Tom Green Co., to Reese-Albert, San Angelo, under **$50,000.**

†**Texas** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston, addnl. outside electrical distr. sys. exten., Bexar Co., to Calvert & Watts, 302 Barrett Ave., San Antonio, under **$50,000.**

†**Texas** — ELECTRICAL DISTRIBUTION — U. S. Eng., Fort Sam Houston, outside electrical distr. sys., Spec. 42-513, Bell Co., to H. Bell, Brownwood, under **$50,000.**

†**Texas** — ELECTRICAL DISTRIBUTION — U. S. Eng., Fort Sam Houston, electrical distr. sys., Bexar Co., to Wright Bros. Electric Co., 405 Main St., San Antonio, under **$50,000.** CD 11/13—ENR 11/19.

†**Texas** — ELECTRICAL DISTRIBUTION — U. S. Eng., 25 St. and Avenue F, Galveston, outside electrical distr. sys., Cameron Co., to Allied Constr. Co., 4624 S. Versailles St., Dallas, under **$50,000.**

†**Texas**—GASOLINE FUELING SYSTEMS—U. S. Eng., Fort Sam Houston, gasoline fueling sys., steel storage tanks, etc., Spec. 42-243, Bexar Co., to Glovebox Taximeter Corp., 4001 Navigation Blvd., Houston, **$50,000-$100,000.** Bids 9/8, awarded 11/20. CD 9/2.

†**Texas**—GASOLINE FUELING SYSTEM—U. S. Eng., 25 St. and Avenue F, Galveston, a.c. gasoline fueling sys., Galveston Co., to J. P. Nash, 410 Nash Rd., Austin, under **$50,000.** Awarded 11/23. CD 11/11—ENR 11/19.

†**Texas**—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, imprvs., grading, Hunt Co., to Texas Bitulithic Co., 111 Commerce St., Dallas, **$50,000-$100,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., tillage, and dirt work, Hays Co., to Texas Bitulithic Co., 111 Commerce St., Dallas, and Gulf Bitulithic Co., 2820 Polk St., Houston, under **$50,000.** Awarded 11/16.

†**Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., Spec. 42-581, Bexar Co., to Quisle & Andrews, 601 Builders Exchange Bldg., San Antonio, under **$50,000;** electrical work, to Martin Wright Electric Co., Auditorium Circle, San Antonio, **$2,660.** CD 11/11—ENR 11/19.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., bldg., Hidalgo Co., to F. M. Simmons, P. O. Box 269, Beeville, under **$50,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., Howard Co., to Ross Constr. Co., San Angelo, **$100,000-$500,000.** Bids 11/17. CD 11/13.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., Brazos Co., to Tellepsen Constr. Co., 3900 Clay St., Houston. **$50,000-$100,000.**

†**Texas**—IMPROVEMENTS, etc.—U. S. Eng., 25 St., and Avenue F, Galveston, imprvs., surfacing, grading, Hidalgo Co., to Ballantyne Eng. Co., 945 Esperson Bldg., Houston. **$50,000-$100,000.** Bids 11/17. CD 11/24, under LB.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., Hidalgo Co., to T. B. Hubbard, 1507 Delano St., Houston. **$100,000-$500,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, Lennan Co., to Smith Building, Mc. Franklin St., Waco. **$100,000-$**[illegible], 2212 11/16. CD 11/13. Bids

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., Victoria Co., to F. M. Simmons, P. O. Box 269, Beeville, under **$50,000.**

Texas—OIL WELL—Bell & Hosser, Construction Bldg., Dallas, drilling, [illegible]ing, developing deep test oil well, Bazette Townsite, Navarro Co., force account. **$50,000.**

†**Texas**—SITE GRADING—U. S. Eng., Fort Sam Houston, site grading, bldg. area, Bell Co., to H. Page, Norwood Bldg., Dallas, **$100,000.** **$50,000-**

†**Texas**—SPRINKLER SYSTEM—U. S. Eng., 231 W. Main St., Denison, automatic sprinkler sys., facilities, Solic. 257-43-92, Gregg Co., to W. H. La Dew, 3010½ Hickory St., Dallas, under **$50,000.**

†**Texas**—UNDERGROUND UTILITIES—U. S. Eng., Fort Sam Houston, underground utilities, Spec. 42-509, Bastrop Co., to Panhandle, Sira-Dalton, McGregor, over **$50,000.**

†**Texas**—UNDERGROUND UTILITIES—U. S. Eng., Fort Sam Houston, underground utilities, Bexar Co., to Truehart, Caldwell & Lee, Builders Exchange Bldg., San Antonio, over **$50,000.**

Tex., Bruni—OIL WELL—H. H. Weinert and A. B. Bauchman, Seguin, drilling, casing, developing 2,750 ft. oil well No. 1. A. Guerra, force account. **$40,000.**

Tex., Encino — OIL WELL — Sun Oil Co., Corpus Christi, 8,000 ft. deep test oil well, No. A-2, Boedecker-State, Survey 10, Brooks Co., force account, **$60,000.**

Tex., Elroy—OIL WELL—Marts & Beaven, Construction Bldg., Dallas, 1,200 ft. test oil well, near here, force account. **$30,000.**

Tex., Hebbronville — OIL WELL — Sun Oil Co., Corpus Christi, 7,000 ft. deep test oil well, 27 mi. southwest of here, No. 2-A-T-T, in Santa Domingo de Arriba grant, force account. **$48,000.**

†**Utah**—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, addnl. imprvs., housing, Tooele Co., to Harrison-Dorman, Terminal Bldg., Salt Lake City.

†**Utah**—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., to C. E. Nelson, Logan, under **$100,000.** BA 10/30.

†**Utah**—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., Weber Co., to R. E. McKee, 4700 San Fernando Rd. W., Los Angeles, Calif., under **$400,000.** Bids 11/9.

★**British Columbia** — IMPROVEMENTS — Dpt. Transport, Ottawa, Ont., imprvs., to Northern Constr. Co. and J. W. Stewart, Ltd., 736 Granville St., Vancouver, **$1,800,000.**

B. C., Princeton—IMPROVEMENTS—Dpt. Transport, Ottawa, Ont., imprvs., to Dutton Bros. & Co., Ltd., Calgary, Alta., about **$165,000-$180,000.**

B. C., Sumas — IMPROVEMENTS — Dpt. Transport, Ottawa, Ont., imprvs., to Dawson-Wade & Co., Ltd., 775 Clark St., Vancouver, about **$150,000.** CD 8/20—ENR 8/27.

Man., Winnipeg — IMPROVEMENTS — Dpt. Transport, Ottawa, Ont., imprvs., to Tomlinson Constr. Co., 1 Somerset Bldg., about **$220,000.**

Ont., Armstrong — IMPROVEMENTS—Dpt. Transport, Ottawa, Ont., imprvs., to Long Lac Constr. Co., Ltd., Port Arthur, about **$35,000.**

LATIN AMERICA

Nicaragua—Government of Nicaragua, A. Somoza, pres., Managua, plans hard surfaced road from San Benito, point on Inter-American Hy. to Rama on Escondido River, 60 mi. from Bluefields. United States will finance.

PUBLIC BUILDINGS

PROPOSED WORK

†**Alabama**—U. S. Eng., Ft. McClellan, revised plans bldg., Calhoun Co. $150,000.

★†**Ark., Camp Robinson**—U. S. Eng., 300 Bway., Little Rock, camp expansion. Over $5,000,000.

†**California**—Bethlehem-Alameda Shipyards, Inc., 2308 Webster St., Alameda, school, Alameda Co. Federally financed.

†**California** — Dpt. Agriculture, Emergency Guayule Rubber Project, Box 1609, Salinas, plans by Chas. E. Butner, 7 Winham St., Salinas, labor camp, row family shelters, admin. and utility bldgs., etc., Colusa Co.

★†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by S. F. Jeter, Jr., 5 Lewis St., Hartford, dwelling units, Conn. 6128. $1,200,000.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., dormitory-community unit. $150,000.

★†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by Ebbets & Frid, 15 Lewis St., Hartford, housing, Conn 6132. $2,000,000. CD 11/5—ENR 11/12.

★†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by Golden Storrs & Co., 343 Fairfield Ave., Hartford, housing, Conn 6133. $1,000,000.

★†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by Maxwell Moore & Charles Salsbury, 967 Farmington Ave., West Hartford, frame housing, Conn 6134 $1,080,000. CD 11/23—ENR 11/26.

★†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by F. H. Beeckwith, 115 Wall St. and J. G. Phelan, 211 State St., both Bridgeport, frame housing, Conn 6067. $1,200,000. Fletcher-Thompson Co., Inc., 211 State St., Bridgeport, consult. engrs. CD 11/18—ENR 11/26.

†**Connecticut** — Industrial Company plans completed temporary bldg. $40,000. Federally financed. Albert Kahn Assoc. Archts. & Engrs. Inc., 345 New Center Bldg., Detroit, Mich., engrs.

D. C., Wash. — District Comrs., District Bldg., bids soon Stanton Elementary school, Merritt-Miller School, $272,500. CD 11/4 and 5—ENR 11/12.

D. C., Wash. — District Comrs., District Bldgs. bids soon Gallinger Hospital facilities, $218,00.

†**Ia., Davenport**—City plans by Consoer, Townsend & Quinlan, 211 W. Wacker Dr., Chicago, Ill., Isolation hospital, Ia-13-107. $102,300. **FWA.**

★†**Illinois**—Defense Plant Corp., 38 S. Dearborn St., Chicago, Ill., hemp plants. Commodity Credit Corp., The Mall, between 12 and 14 Sts. S.W., Wash., D. C. will operate.

†**Illinois**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, plans by J. F. Lankton & J. Ziegler, Peoria, dormitory apartments.

★†**Indiana**—Commodity Credit Corp., The Mall, between 12 and 14 Sts. S.W., Wash., D. C., hemp processing plants. $1,500,000.

★†**Kansas**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., addnl. plant facilities. Over $2,300,000. Boeing Aircraft Co., Seattle, Wash., will operate.

†**Kan., Wichita**—St. Joseph Hospital, Wichita, hospital addn. $450,000. **FWA.**

†**Maine**—Farm Security Admin., 17 Brief Ave., Upper Darby, Pa., trailer type housing units, over $150,000; barracks.

†**Maryland**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., will not receive bids Dec. 1, temporary housing, Md-18163 and dormitory apartments, Md-18164. Projects cancelled. CD 11/10—ENR 11/12.

†**Minnesota**—U. S. Govt., Commodity Credit Corp., Dpt. Agriculture, The Mall, 12 to 14 Sts. S.W., Wash., D. C., 14 hemp-processing plants, $33,000 each. Total est. $462,000. Defense Plant Corp. will finance. CCC to supervise bldg. and operating plants.

†**New Jersey**—U. S. Eng., 120 Wall St., New York, N. Y., addnl. bldgs., facilities, Middlesex Co.

★†**New Jersey**—General Motors Corp., General Motors Bldg., Detroit, Mich., addnl. plant facilities, over $200,000; addnl. plant facilities. Over $2,000,000. Defense Plant Corp. will finance.

N. J., Secaucus—Bd. Freeholders, Hudson Co., Courthouse, Jersey City, altering unused bldgs., Old Emergency Hospital. F. Radigan, Courthouse, Jersey City, engr.

★†**New York**—Republic Aviation Corp., Farmingdale, addnl. plant facilities. Over $5,000,000. Defense Plant Corp. will finance.

N. Y., Brooklyn—Fire Dpt., Municipal Bldg., New York, plans by A. Gordon Lorimer, c/o owner, altering 5 story firehouse, 18-28 Hooper St. $75,000.

†**North Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., dormitory unit housing.

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, bldg., Durham Co.

★†**O., Dayton**—Pub. Housing Auth., NHA, 9 St. and Prospect Ave., Cleveland, 200 unit permanent housing, Ohio-33155.

★†**O., Fairfield-Osborne**—Pub. Housing Auth., NHA, 9 St. and Prospect Ave., Cleveland, 320 unit temporary housing, Ohio 33154.

★†**O., Moraine City**—Pub. Housing Auth., NHA, 9 St. and Prospect Ave., Cleveland, 200 unit temporary housing, Ohio-33058.

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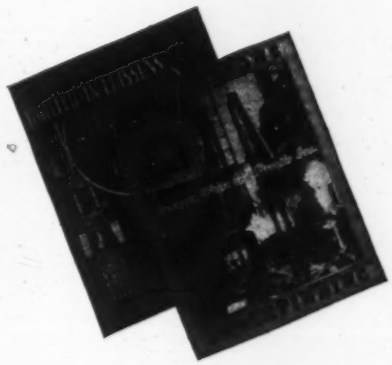

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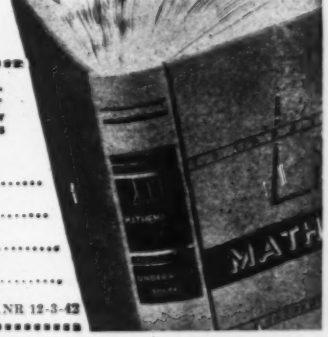

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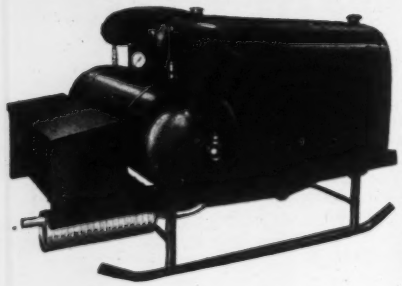

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†O., Vandalia—Pub. Housing Auth. NHA, 9 St. and Prospect Ave., Cleveland, 100 unit temporary housing, Ohio-33057.

†Pennsylvania — Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant. $300,000. Rohm & Haas Co., 222 W. Washington Sq., Phila., will operate.

★**†South Dakota**—U. S. Eng., Administration Bldg., Fort Peck, Mont., bldgs., Custer Co. Over $5,000,000.

S. D., Rapid City—Black Hills General Hospital, Rapid City, plans by J. C. Ewing, Rapid City, enlarging, imprv. hospital bldgs. $230,550. Applied to FWA.

†Texas—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, bids soon housing, Tex. 41-083 and dormitory unit housing, Tex. 41-084. E. F. and J. F. Rittenberry and J. Roy Smith, 1000 Fisk Bldg., Amarillo, archts.

†Texas—U. S. Eng., Fort Sam Houston, bldg., Bexar Co. $45,000 authorized.

†Texas—U. S. Eng., 231 W. Main St., Denison, bldgs., facilities, underground utilities, Grayson Co. $50,000-$100,000.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs. facilities, underground utilities, Harris Co. $50,000-$100,000.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., underground utilities, facilities, Howard Co. $50,000-$100,000.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., McLennan Co. $50,000.

†Texas—U. S. Eng., Fort Sam Houston, bldgs., facilities, incl. WW, sewerage, electrical distr. sys., Medina Co. $50,000-$100,000.

†Texas—U. S. Eng., Fort Sam Houston, bldgs., facilities, electrical distr. sys., WW and sewers, Bexar Co. $50,000-$100,000.

†Texas—U. S. Eng., 231 W. Main St., Denison, bldgs., facilities, WW, sewers, electrical distr. sys. Hunt Co. $50,000-$100,000 authorized.

†Texas—U. S. Eng., 231 W. Main St., Denison, bldgs., facilities, electrical distr. sys., WW, sewers, Potter Co. $50,000-100,000.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., facilities, electrical distr. sys., WW, sewers, Tom Green Co. $50,000-$100,000.

†Tex., Lubbock—Federal Security Agency, Maverick Bldg., San Antonio, recreation center and facilities, Tex. 41-578. $32,300 FWA funds allotted. CD 11/20—ENR 11/26.

†Washington—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant. Over $200,000. Hooker Electrochemical Co., Niagara Falls, N. Y., will operate.

†Washington—Everett Housing Auth., Medical-Dental Bldg., Everett, indefinitely postponed bids to have been opened Nov. 23, temporary housing, for NHA. $200,000. E. W. Morrison & Associates, 719 Second Ave. Bldg., Seattle, archts. CD 11/17.

★**†Wash., Bremerton**—Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., 2 story, 42x238 ft., 3 story, 67x85 ft. and 4 story, 42x100 ft. hospital, Docket 45-124. $750,000. **FWA.** F. A. Naramore, Smith Tower Bldg., Seattle, archts. CD 4/17—ENR 4/23.

★**†Wisconsin**—A. O. Smith Corp., 3533 N. 27 St., Milwaukee, addnl. 4 stories on bldg., 180x300 ft., to S. M. Siesel Constr. Co., 514 E. Ogden Ave., Milwaukee. $536,000. Defense Plant Corp. will finance. Tullgren, Grassold & Johnson, 734 N. Jefferson St., Milwaukee, archts.

†Alaska, Ketchikan—Federal Works Agency, Alaska Bldg., Seattle, addn. Ketchikan General Hospital. $100,000.

N. B., St. John—General Hospital Bd., c/o Councillor E. C. Seely, St. John, nurses residence and hospital addns. $150,000.

Ont., Camp Borden—Secretary Dpt. Munitions & Supply, Ottawa, bids soon hospital addn., nurses home, concrete magazine, chapel, Advanced Training Center, Military Camp, for Dpt. Natl. Defense, Ottawa. $180,000.

Ont., Collingwood—Wartime Housing, Ltd., 55 York St., Toronto, 50 addnl. houses, to Hill-Clark-Francis, Ltd., Whitewood Ave., New Liskeard, about **$110,000.**

★**Ont., Hamilton**—Wartime Housing Ltd., 55 York St., Toronto, bids soon, 300 brick houses, also addn. to number temporary houses, east end city. $800,000.

★**Ont., Pickering**—Wartime Housing Ltd., 55 York St., Toronto, 300 addnl. houses. $1,000,000. Gore & Storrie, 1130 Bay St., Toronto, engrs.

Ont., Toronto—East General Hospital Bd., 14 Coxwell Ave., bids early December, superstructure 5 story, 44x120 ft., brick, rein.-con. hospital addn. $200,000. City granted $150,000. K. S. Gillies, City Hall, archt. CD 8/31—ENR 9/10.

Ont., Toronto — Secretary Bd. [illegible]ntrol, Toronto, bids soon, 2 story, bsmt. [illegible]ldn., for Wellesley Hospital Bd., 7 H[illegible]wood Pl. Over $150,000. D. E. Kertland, [illegible]-hill Gardens, archt. CD 9/24—[illegible] 10/1.

Ont., Windsor — Dominion G[illegible] Ottawa, plans by Dpt. National Defe[illegible] Ottawa, garage at Military Barracks. [illegible]ng. Lt. Col. W. M. Veitch, M.D. 1, Lon[illegible] engr.

Que., Three Rivers—Wartime H[illegible]ng Ltd., 55 York St., Toronto, Ont., 100 h[illegible] $250,000.

BIDS ASKED

Bids Asked After November

★**†Arkansas** — Pub. Housing Auth., NHA, Electric Bldg., Fort Worth, Tex., [illegible]mountable housing, Project 3061; permanent housing; dormitory units, Project 3063.

Bids Asked December 7

★**†Va., Arlington**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 500 unit housing, Va-44018. Extended date. Faulkner, Kingsbury, 917 15 St. N.W., Wash., D. C., archts.

★**†Va., Arlington** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., 500 unit housing, Va-44019. Murphy & Locraft, 1413 H St. N.W., Wash., D. C., archts.

★**†Va., Arlington** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 680 unit dormitory apartments, Va-44231. Heaton & Chatelain, 1211-A Conn. Ave., Wash., D. C., archts.

Bids Asked After December 7

†Pennsylvania—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., permanent dwellings, Pa-36108. Sherone, McWilliams & Associates, 6100 Penn Ave., Pittsburgh, archts. CD 9/17—ENR 9/24.

Bids Asked December 9

†N. C., Monroe—Pub. Bldgs. Admin., New Post Office Bldg., Atlanta, Ga., repairing post office.

B. C., Port Alberni—Secretary Dpt. P. Wks., Ottawa, Ont., new shed and fdn., north side assembly wharf. $45,000. Plans deposit $10.

Bids Asked About December 10

†New Mexico—U. S. Eng., Albuquerque, bldgs., underground utilities, Lea Co. Over $150,000. Plans deposit $100.

†New Mexico—U. S. Eng., Albuquerque, bldgs., underground utilities, Luna Co. Over $150,000. Plans deposit $100.

†New Mexico—U. S. Eng., Albuquerque, bldgs., underground utilities, Otero Co. Over $150,000. Plans deposit $100.

Bids Asked December 10

★**†Va., Newport News**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 1,000 unit dormitory housing, Va-44043. CD 11/10—ENR 11/12.

★**†Maryland** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., temporary housing, Md 18162. A. P. Clark, Jr., 816 14 St. N.W., Wash., D. C., archt. Egli & Gompf, Inc., 425 St. Paul Pl., Baltimore, engrs. CD 11/23—ENR 11/26.

†Texas—U. S. Eng., Albuquerque, N. M., bldgs., underground utilities, Floyd Co. Over $150,000. Plans deposit $100.

†Texas—U. S. Eng., Albuquerque, N. M., bldgs., underground utilities, Lubbock Co. Over $100,000. Plans deposit $100.

Bids Asked About December 11

†Texas—U. S. Eng., Albuquerque, N. M., bldgs., El Paso Co. Over $150,000. Plans deposit $75.

Bids Asked December 11

★**†Maryland** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., dormitories, Md 18154. Extended date. CD 11/2—ENR 11/5.

†Ind., Kingsburg — Pub. Housing Auth., NHA, at office A. D. Taylor & Associates, engr.-archt., 4614 Prospect Ave., Cleveland, O., construction, completion Commercial Units A, B, C and D, and theatre on Kingsford Heights War Housing, Proj. Ind.-12057, near here.

Bids Asked About December 12

†Texas—U. S. Eng., 231 W. Main St., Denison, bldgs., Smith Co. $300,000. Plans deposit $50.

Bids Asked December 14

†Colorado — Pub. Housing Auth., NHA, Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., dormitory apartments, Colo-5032 and temporary housing, Colo-5031. Extended date. T. H. Buell, Buell Bldg., Denver, archts. CD 11/25—ENR 11/26.

Bids Asked December 15

★**†D. C., Wash.**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., 200 unit demountable housing, DC-49060. Extended date. CD 11/12—ENR 11/19.

PUBLIC BLDGS. (Bids Asked, Cont'd.)

†**Mich., Roseville**—Federal Works Agency, 18 and F Sts. N.W., Wash., D. C., school. CD 11/20—ENR 11/26.

Bids Asked December 15

★†**Maryland** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 426 unit temporary housing, Md.-18211 between Riverdale and College Park. Extended date. Skidmore, Owings & Merrill, 5 E. 57 St., New York, N. Y., archts. CD 11/20—ENR 11/26.

Bids Asked December 16

†**Missouri** — Pub. Housing Auth., Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., frame community bldgs., site preparation.

Bids Asked December 17

†**N. C., Winston-Salem**—Pub. Bldgs. Admin., 214-M, Federal Annex, Atlanta, Ga., repairing post office, exterior and interior painting, plaster repairs, caulking and masonry repairs.

Bids Asked December 18

†**Kan., Salina**—Pub. Housing Auth., NHA, Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., 20 unit dormitory apartments, Kan-14051. W. E. Glover, Westboro Mart Bldg., St. Louis, Mo., archt. CD 11/23—ENR 11/26.

Bids Asked December 21

★†**Utah, Ogden**—Pub. Housing Auth., NHA, Dierks Bldg., 10 St. and Grand Ave., Kansas City, Mo., 400 unit dormitory apartments, Utah-42018; 600 unit dormitory apartments, Utah-42019; 200 unit dormitory apartments, Utah-42051; 600 unit dormitory apartments, Utah-42052. Hodgson, Aston & Evans, 806 Eccles Bldg., archts. CD 10/16—ENR 10/22.

†**Va., Arlington**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 100 unit temporary housing, Va-44232. A. I. Cassel, 1903 14 St. N.W., Wash., D. C., archt.

Bids Asked About December 30

★†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., temporary dwellings, Pa. 36254. Extended date. Demchick & Supowitz, 220 S. 16 St., Phila., archts. CD 11/19—ENR 11/26.

Bids Asked January 26

†**Ind., Marion**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., D. C., clinical bldg. No. 124, etc.

Bids Asked

†**Maine**—U. S. Eng., Park Square Bldg., Boston, Mass., (selected list bidders) temporary bldgs., No. 175-43-NEG 151, Aroostook Co.

†**Massachusetts**—Pub. Housing Auth., NHA, 24 School St., Boston, administration and community bldg., Project 19061. Plans deposit $25 first set, $5 each addnl. set.

†**New Jersey**—U. S. Eng., 6 and Walnut Sts., Phila., Pa., 1 story bldgs., extens., exten. water supply sys., Monmouth Co.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., temporary dwellings, Pa-36024. CD 10/19—ENR 10/22.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., Howard Co. $150,000. Plans deposit $25.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., McLennan Co. $150,000. Plans deposit $25.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, military housing, recreation bldgs., etc. No. 257-43-147, Potter Co. $150,000. Plans deposit $50.

†**Texas**—U. S. Eng., Albuquerque, N. M., bldg. addn., Reeves Co. $80,000. Plans deposit $50.

LOW BIDDERS

★**District of Columbia** — Alley Dwelling Auth., 1737 L St. N. W., Nov. 24, Lily Pond housing, DC49054 from C. B. Ross Co., Inc., 2 Lafayette St., New York, N. Y., **$1,368,000.** CD 11/20—ENR 11/12.

†**Louisiana**—U. S. Eng., foot of Prytania St., New Orleans, Nov. 25, bldg. facilities, Inv. 43-182, from E. E. Rabalais & Son, Bunkie. CD 11/20.

†**Maryland**—U. S. Eng., Edgewood, Nov. 24, bldgs., Harford Co., from Durham & Irvine, 1713 Rittenhouse Sq., Phila., Pa., over **$100,000.**

★†**New York**—Schenectady Municipal Housing Auth., Schonowee Village, 402 Millard St., Nov. 21, general construction housing, NYS-14, incl. heating, plumbing, electrical work, except lawns and planting, for NHA, from Stein Constr. Corp., 551 5 Ave., New York, **$1,384,000** base bid. CD 11/19—ENR 11/12.

†**North Carolina**—U. S. Eng., Fort Bragg, Nov. 17 bldgs., covered walks, Cumberland Co., from R. F. Kirkpatrick & Son, Burlington.

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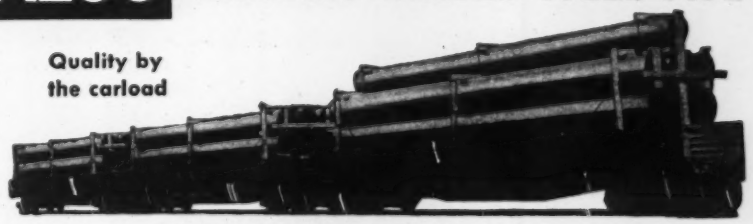

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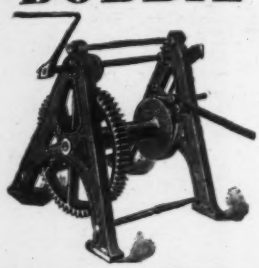

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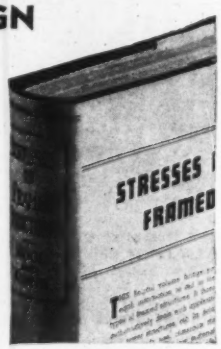

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PUBLIC BUILDINGS (Low Bidders Cont'd)

†**Oklahoma**—U. S. Eng., 231 W. Main St., Denison, Tex., bldgs., Kiowa Co., [illegible] Johnson, Peterson, Busboom & [illegible] Salina, Kan., **$100,000-$500,000.**

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., [illegible] permanent dwellings, Pa-36273, from [illegible] Azzarone, 30-45 31 St, Long Island [illegible] N. Y., **$431,700.** CD 11/19—ENR 1/26.

†**Texas**—U. S. Eng., c/o Rollins & Forest, Praetorian Bldg., Dallas, bldg., [illegible] 150, from Geo. P. O'Rourke Constr. Co., 2019½ Jackson St., Dallas. Est. over $100,000. CD 11/27.

†**Wisconsin**—Industrial Company, Nov. 18, general contract plant, from Johnson & Kramer, St. Charles, Minn., $129,6[illegible]***heating, ventilating, plumbing, from G. J. Koskey, La Crosse, **$31,600***** electrical work, from Capital Electric Co., 147 S. Butler St., Madison, **$14,550.** U. S. Dpt. Agriculture will finance.

★†**Wisconsin**—At office Bogner, Dahl, Law & Potter, archts., 1 S. Pinckney St., Madison, Nov. 21, housing, Project 47503, for Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., from B. W. Handler Constr. Co., 10 E. 13 St., Chicago, Ill., $1,339,000. CD 11/4—ENR 11/5.

CONTRACTS AWARDED

★†**Alabama**—U. S. Eng.; Gadsden, Contr. 1, bldgs., to Daniel Constr. Co., 824 7 Ave. S., Birmingham***Contr. 2, miscellaneous bldgs., fencing, to H. A. Ivey, Decatur, Ga.*** Contr. 3, concrete roads, to Ready-Mixed Concrete Co., Rome, Ga.***reservoir to C. G. Kershaw Contg. Co., 2212 20 Ave. S., Birmingham, all foregoing in Etowah Co. Total est. **$5,000,000.** Bids 11/23. Warren-Knight & Davis, Protective Life Bldg., Birmingham, archts. Polglaze & Basenberg, 1st Natl. Bldg., Birmingham, sanitary engrs.

†**Alabama**—U. S. Eng., Ft. McClellan, addnl. housing, Calhoun Co., to A. R. Abrams Const. Co., Kemper Bldg., Atlanta, Ga., **$100,000-$500,000.**

†**Alabama**—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., temporary frame bldgs., Calhoun Co., to Hallman Bros., 625 Spring St., N. W., Atlanta, Ga. **$100,000-$500,000.**

†**Ark., Pine Bluff**—L. Blackwell, mayor, hospital, Ark 3-170 to Harmon Constr. Co., 1138 N.W. 4 St., Oklahoma City, Okla., **$225,000. FWA.**

†**California**—Industrial Company, 2 storage mezzanine floors and bldg., Contra Costa Co., to H. H. Larsen Co., 64 South Park St., San Francisco. Federally financed. CD 11/23—ENR 11/26.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, new bldgs., alterations, addns., Los Angeles Co., to Stiles O. Clements, 1135 Van Nuys Bldg., Los Angeles, over **$150,000.**

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, bldgs., appurtenant facilities, No. 941, Los Angeles Co., to F. L. and G. A. Froley, 9011 Wilshire Blvd., Beverly Hills, over **$100,000.** Awarded 11/20.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldgs., Marin Co., to J. A. Younger & H. A. Dutton, Jr., Cheda Bldg., San Anselmo. Awarded 11/24.

★†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, housing, recreation bldgs., Sol. 886, Riverside Co., to Zoss Constr. Co., 1037 N. Cole Ave., Los Angeles, over **$1,000,000.**

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldgs., San Francisco Co., to Biltwell Constr. Co., 4745 Geary St., San Francisco. Awarded 11/25.

†**Florida**—U. S. Eng., U. S. Courthouse & Custom House, Jacksonville, addnl. bldgs., Inv. NEG—Jax-43-346 and boundary fences, Inv. NEG-M.T.-43-4, to Brady Roofing Tile Mfg. Co., 3260 N.W., 27 St., Miami, under **$550,000;** bldgs., Inv. NEG-M.I.-43-6, to Heath & Mann, 3221 S.W., 25 St., Miami, under **$50,000,** all foregoing in Dade Co. Awarded 11/7 and 11/8 respectively.

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, storehouse, Inv. NEG-B.G.-43-7, Dade Co., to Fred Howland, Inc., 1114 Postal Bldg., Miami, under **$50,000.** Awarded 11/5.

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, bldgs., Inv. Neg-M.I.-43-5, Dade Co., to Brady Roofing Tiles Mfg. Co., 3260 N.W. 27 St., Miami, under **$500,000.** Awarded 11/9.

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, bldgs., Inv. Neg-O.R.-43-22, Orange Co., to Johnson & Mann, Walgreen Bldg., St. Petersburg, under **$50,000.** Awarded 11/11.

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, addnl. bldgs., Inv. Neg-Jax 43-347, Pinellas Co., to Palmer Eng. & Constr. Co., Cassett Ave., Jacksonville, Fla., under **$500,000.** Awarded 11/6.

★†**Fla., Marianna**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., general contract 100 unit temporary dormitory apartments, Fla-8152, and 125 unit temporary family dwellings, with community facilities, Fla-8154, incl. site imprvs., plumbing, heating, electrical work, landscaping, to A. J. Honeycutt Co., Inc., 2512 8 Ct. N., Birmingham, Ala. **$407,395.** CD 11/4—ENR 11/11.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Georgia**—U. S. Eng., Post Office Bldg., Savannah, bldgs., Richmond Co., to Knox Bros. Lumber Co., Thomson. Burge & Stevens, Palmer Bldg., Atlanta, archts. Bids 11/24. CD 11/5—ENR 11/12.

★†**Illinois**—U. S. Eng., 520 Merchandise Mart, Chicago, construction for manufacturing plant, Cook Co., to Standard-McQueen-White, Forest Park, over **$2,000,000.**

†**Illinois**—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., repair shop, Lake Co., to Chell & Anderson, Inc., 175 W. Adams St., Chicago, under **$50,000.**

†**Illinois**—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, Mo., temporary frame bldgs., Madison Co., to Bank Bldg. & Equipment Corp. of America, 906 Sidney St., St. Louis, Mo., **$100,000-$500,000.**

†**Illinois**—U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, Mo., furnishing, installing electrical facilities bldgs., altering existing wiring facilities, etc., Neg. 1103-43-96, St. Clair Co., to Bumiller & Meyersieck, 2067½ S. Jefferson Ave., St. Louis, Mo. Est. under **$50,000.**

†**Illinois**—U. S. Eng., 520 Merchandise Mart, Chicago, bldgs., Will Co., to Chell & Anderson, 176 W. Adams St., Chicago.

†**Iowa**—U. S. Eng., Arsenal, Rock Island, Ill., temporary frame bldgs., to Viggs M. Jensen, Albert Lea, Minn., **$50,000-$100,000;** towers and utility yard, to J. H. Hunzinger & Co., Security Bldg., Davenport, each under **$50,000.**

†**Kentucky**—U. S. Eng., Federal Bldg., Louisville, temporary frame bldgs., Hardin Co., to Thorp-Rogoff Co., 306 S. Wabash St., Chicago, Ill. **$100,000-$500,000.**

†**Kentucky**—U. S. Eng., Federal Bldg., Louisville, temporary frame bldgs., Union Co., to Peerson Constr. Co., Benton Harbor, Mich., **$100,000-$500,000.** CD 10/27—ENR 10/29.

★†**Ky., Danville**—U. S. Eng., U. S. Post Office & Courthouse, Cincinnati, O., construction in connection with Darnall General Hospital expansion, to James Burton Co., 179 W. Washington St., Chicago, Ill., over **$1,000,000.**

★†**Louisiana**—Industrial Company, plant, to Turner Const. Co., 420 Lexington Ave., New York. Est **$30,000,000.** Federally financed. CD 11/18—ENR 11/26.

†**Massachusetts**—Wico Electric Co., Phelon Ave., West Springfield, 1 story, bsmnt., concrete, brick plant to Ernest F. Carlson, Inc., 1494 Main St., Springfield, **$47,000.** Defense Plant Corp. will finance.

†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, temporary bldgs., No. 175-43-NEG 141, Barnstable Co., to Daniel Cunningham Constr. Co., 20 Kilby St., Boston. Est. **$100,000-$500,000.** Bids 11/20. CD 11/19.

†**Michigan** — U. S. Eng., 520 Merchandise Mart, Chicago, Ill., construction, completion miscellaneous bldgs., utilities, appurtenances thereto, Calhoun Co., to Miller-Davis Co., Kalamazoo, **$100,000-$500,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, laboratory bldg., Wayne Co., to Gerhardy Constr. Co., 2297 E. Forest Ave., Detroit, less than **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, 7 theatre of operations type B-bldgs., Chippewa Co., to Howard MacDonald, Sault Ste. Marie, less than **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, rehabilitating Bldg. 16 and miscellaneous bldgs., Wayne Co., to Barton Malow Co., 2631 Woodward St., Detroit, less than **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, general contract bldgs., Wayne Co., to Campbell Constr. Co., 3255 Goldner Ave., Detroit; electrical work, to Wayne County Electric Co., 15330 Michigan Ave., Dearborn. Est. less than **$1,000,000.**

†**Michigan**—U. S. Eng., 420 Merchandise Mart, Chicago, Ill., bldgs., to Miller-Davis Constr. Co., Kalamazoo. Est. approx. **$300,000.** CD 10/16—ENR 10/22.

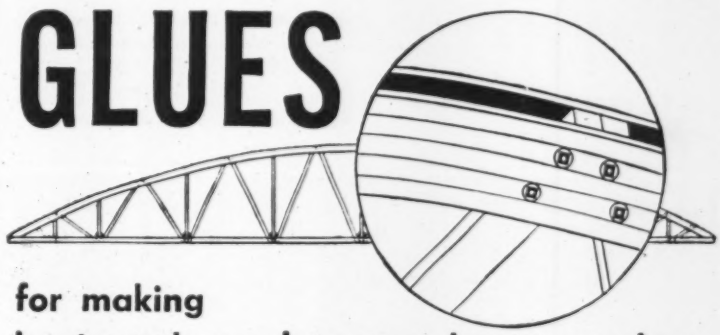
★†**Missouri**—Defense Plant Corp., 811 Vermont Ave. N. W., Wash., D. C., design, construction bldgs., to H. B. Deal & Co., Inc., 1218 Olive St., St. Louis. Est. **$1,178,760** plus.

†**Missouri**—U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, brick bldg., concrete fdns., electrical facilities, Negotiation No. 1102-43-95, St. Louis Co., to J. A. Prahl Bldg. & Contg. Co., 5521 S. Grand Blvd., St. Louis, under **$50,000.** Bids 11/16.

†**Missouri**—U. S. Eng., 19 E. 17 St., Kansas City, Mo., electrical work for bldgs., Johnson Co., to Alber Electric Co., 331 E. 55 St., Kansas City, Mo. CD 11/4—ENR 11/12 under CA.

†**New Jersey**—Industrial Company, plant bldg., Union Co., to Oscar A. Peterson Constr. Co., 75 Willow St. N., Montclair, **$65,000.** Defense Plant Corp. will finance. Bids 11/17. H. I. Feldman, 415 Lexington Ave., New York, N. Y., archt.

GLUES



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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**New Jersey**—U. S. Eng., 120 Wall St., New York, N. Y., 1 story, frame bldgs. Hudson Co., to A. A. La Fountain, Inc., 161 Beech St., Hackensack, **$50,000-$100,000.**

★†**New York**—Pub. Housing Auth., NHA, 270 Bway., New York, permanent housing, NY 30083, to A. J. Paretta Contg. Co., Inc., 43-49 45 St., Long Island City, **$617,120.** Bids 10/13. CD 11/11—ENR 11/19, under LB.

★†**North Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., temporary dormitory housing NC 31080 (T), temporary dormitory apartments, NC 31082, temporary family dwelling units, NC 31083, to H. L. Coble, Greensboro, **$1,056,097** (masonry). Bids 11/23. CD 10/27—ENR 10/29 under BA.

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, temporary frame bldgs., New Hanover Co., to Plowden & Roberts, 1420½ Taylor St., Columbia, S. C.

†**North Carolina**—U. S. Eng., 30 Customhouse, Wilmington, bldgs., New Hanover Co., to Grannis, Higgins, Thompson & McDevitt, Goldsboro. Bids 11/19.

★†**Ohio**—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., 13 concrete block theatre of operation type bldgs., fencing, Ottawa Co., to Mosser Constr. Co., Fremont, less than **$1,000,000.**

★†**Pennsylvania**—Washington County Housing Auth., homes, Pa. 17-1 and 17-2, for NHA, to J. S. O'Connell, 259 W. 14 St., New York, N. Y. **$805,789.** Bids 10/21. CD 10/15.

★†**Pennsylvania** — Chester Housing Auth., Community Bldg., Lamokin Village, Chester, housing, Pa. 36265, for NHA, to J. Weinstein & Co., 66 Court St., Brooklyn, N. Y., **$794,100.** Bids 11/4. CD 11/9—ENR 11/12, under LB.

†**South Carolina**—U. S. Eng., 33 Customhouse, Charleston, bldgs., utilities, Horry Co., to John C. Heslep Co., Carolina Life Bldg., Columbia. Bids 11/14.

†**South Carolina**—U. S. Eng., Shaw Field, bldgs., Richland Co., to M. B. Kahn Constr. Co., 714 Lady St., Columbia.

★†**Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, bldg. addn. Coffee Co. to Boone & Holt Constr. Co., 3 Natl. Bank Bldg., Nashville, under **$1,000,000.**

†**Tennessee**—U. S. Eng., 306 U. S. Courthouse, Nashville, electrical work for bldgs., Coffee Co., to Edenfield Electric Co., 517 8th Ave. S., Nashville, **$500.**

†**Tennessee**—U. S. Eng., 307 U. S. Courthouse, Nashville, bldgs., Davidson Co., to Gardner Constr. Co., 108 Hermitage Ave., Nashville, **$100,000-$500,000.**

★†**Texas**—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, prefabricated housing, to Houston Ready-Cut House Co., 3601 Polk St., Houston, **$275,000**; housing, Tex-41-103, to Glade Constr. Co., Wichita Falls, **$268,000.**

†**Texas** — Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, site development for housing, Tex. 41-142, to Vanderver & Christian, Tyler, **$286,000.** CD 11/5—ENR 1/12, under LB.

★†**Texas**—Rubber Reserve Corp., 811 Vermont Ave. N. W., Wash., D. C., plant, to Stone & Webster, Commerce Bldg., Houston, **$2,500,000.** Industrial Company will operate. CD 11/9—ENR 11/12.

†**Texas**—U. S. Eng., Fort Sam Houston, addnl. bldgs., Spec. 42-582, Bexar Co. to Lee Christy, 503 Builders Exchange Bldg., San Antonio, **$100,000-$500,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, addnl. bldg. facilities, incl. electrical distr. sys., underground facilities, steam distr. sys., service dr., sidewalks, parking areas, Spec. 42-430, Bexar Co., to Calvert & Watts, 302 Barrett Ave., San Antonio. Over $200,000.

†**Texas**—U. S. Eng., Fort Sam Houston, bldg., underground utilities, Spec. 42-429, Bexar Co., to Hawley-Riley Inc., 3400 Fredericksburg Rd., San Antonio. **$50,000-$100,000.** Bids 11/6. CD 11/2.

†**Texas**—U. S. Eng., Fort Sam Houston, addnl. bldgs., facilities, Spec. 42-513, Brown Co., to Ross Constr. Co., Brownwood, **$100,000-$500,000.**

†**Texas** — U. S. Eng., Fort Sam Houston, addnl. bldgs., Spec. 42-513, Brown Co., to J. E. Dickey, 216 Eleanor St., San Antonio, over **$100,000**; electrical work, to H. Bell, Brownwood. CD 11/17—ENR 11/19, under LB.

†**Texas**—U. S. Eng., Fort Sam Houston, bldg. facilities, Spec. 42-486, Kinney Co., to W. J. Aldrich, 414 Insurance Bldg., San Antonio, over **$300,000.** Bids about 11/17. CD 11/13.

★†**Texas**—U. S. Eng., 231 W. Main St., Denison, bldgs., Potter Co., to Lambie, Ross, Little & James, Amarillo and Abilene, **$1,000,000-$5,000,000.**

N. J., Radburn (mail Fair Lawn)—Radburn Assoc., Inc., 2 Barry Rd., Radburn, plans by J. T. Rowland, 30 Journal Sq., Jersey City, 2 story, bsmnt., brick, frame community house. $150,000.

★**O., Dayton** — Carillon Homes, Inc., c/o A. B. Kiefaber, 1416 Ruskin Ave., 124 brick houses, south of Stewart St. $500,000.

†**Texas**—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-585, Bexar Co., to C. L. Browning, Jr., Insurance Bldg., San Antonio, over **$300,000.**

†**Texas**—Industrial Company, plants, Jefferson Co., to O. W. Collins, Port Arthur, **$67,000.** Federally financed.

†**Texas**—U. S. Eng., 25 St. and Avenue P, Galveston, bldg., drainage, sewer, water and gas extens., paving, Webb Co., to Alamo Constr. Co., Smith-Young Tower, San Antonio, over **$50,000.** CD 11/30.

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, bldg., Tooele Co., to Intermountain Contractor, Atlas Bldg., Salt Lake City.

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, addnl. facilities, Weber Co., to James L. Barnes Constr. Co., c/o Quartermaster Depot, Ogden, under $500,000. Bids 11/10.

†**Virginia**—U. S. Eng., Fort Monroe, laundry and steam plant, Warwick Co., to Southeastern Constr. Co. and Goode Constr. Co., Sandston, Richmond, **$100,000-$500,000.** (**Correction**—county and contractors.) CD 11/20, under CA.

★†**Washington** — Port Orchard Housing Auth., Port Orchard, housing, Wash.45147, for NHA, to Howard S. Wright & L. H. Horman, 407 Yale Ave. N., Seattle, **$8,000,000** cost plus fixed fee. Jones, Bouillon, Thiry & Silliaasen, 1411 4 Ave. Bldg., Seattle, archts. Parker & Hill, Smith Tower, Seattle, engrs. CD 11/20—ENR 11/26.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, bldg., Spokane Co., to Spencer B. Lane Co., 251 Kearney St., San Francisco, Calif., **$50,000-$100,000.**

†**Wisconsin**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., 1 story, ground floor, 52 x 63 ft., frame office bldg., concrete fdn., to Pantzer Lumber Co., 110 S. 14 St., Sheboygan American Hydraulics, Inc., 21 S. Forest St., Fond du Lac, will operate. CD 8/6—ENR 8/13.

†**Wisconsin**—U. S. Eng., U. S. Post Office & Customhouse, St. Paul, Minn., rehabilitating all bldgs., utilities, installing equip., constructing required new bldgs., Monroe Co., to Toltz, King & Day, Inc., 1509 Pioneer Bldg., St. Paul, Minn. **$100,000-$500,000.**

British Columbia—Dpt. Natl. Defense for Air, Ottawa, Ont., barracks blocks, mess halls, etc., to Marwell Constr. Co., Ltd., 540 Howe St., Vancouver, **$240,000.**

N. B., Scoudouc—Dpt. Natl. Defense, Ottawa, Ont., store house, shop, etc., Repair Depot, to Diamond Constr. Co., Ltd., Royal Bank Bldg., Fredericton, **$50,000.**

Ontario and Quebec—Wartime Housing Ltd., 55 York St., Toronto, Ont., 69 houses, Renfrew, Ont., and 10 houses Lac a La Tortue, Que., to Cook & Leitch, 1440 St. Catherine St. W., Montreal, Que., about **$175,000.** Bids 11/2. CD 10/30.

Ont., Camp Borden—Dpt. Natl. Defense, Ottawa, frame hospital addn., Military Camp, to W. B. Sullivan Constr. Ltd., 30 Bloor St. W., Toronto, **$180,000.** CD 11/16.

Ont., Long Branch (Toronto)—Wartime Housing Ltd., 55 York St., Toronto, 125 addnl. houses, to L. C. Scott Constr. Co., Ltd., 330 Bay St., Toronto, about **$300,000.**

Ont., Petawawa—Dpt. Natl. Defense (Army), Ottawa, officers' and N.C.O.'s quarters, mess halls, barracks blocks, etc., Military Camp, to M. Sullivan & Son, Ltd., Arnprior, $215,000. Bids 10/13. CD 10/7.

Ont., Ravenswood—Dpt. National Defense (Army) Ottawa, hospital addn., nurses home, concrete magazine, chapel, to Johnson Bros. Co., Ltd., 43 Market St., Brantford, about **$180,000.** CD 11/27.

Ont., Rockcliffe (Ottawa)—Dpt. Natl. Defense for Air, Ottawa, hospital, RCAF Station, to Simard Bros. & Co., Ltd., 219 York St., Ottawa, **$160,000.** CD 8/18—ENR 8/27.

Ont., Toronto—University of Toronto, Connaught Laboratories, Simcoe Hall, Queen's Park, altering, exten. laboratories, to Foundation Co. of Ontario Ltd., 1158 Bay St., **$87,641.** Mathers & Haldenby, 96 Bloor St., archts.

Que., La Tuque—Wartime Housing Ltd., 55 York St., Toronto, Ont., 50 houses, to Cook & Leitch, 1440 St. Catherine St. W., Montreal, about **$160,000.**

[redacted]

PROPOSED WORK

★**Me., Portland**—Victory Development Corp., 37 Casco St., 650 unit brick dwellings, probably apartments.

★**N. J., Camden** — Crescent Development Corp., 519 Market St., plans by H. F. Rader, 107 N. 7 St., 18 apartments, 240 units, 2 story, bsmnt., concrete block, brick. $750,000.

N. J., Lakehurst—Lakehurst Base Home Developing Co., 342 Madison Ave., New York, N. Y., one hundred fifty 1½ story bsmnt., frame residences.

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COMMERCIAL BLDGS. (Proposed Work, Continued)

Pa., Phila.—Boardman-Smith Corp., 1322 Airdrie St., 45 housing units, Eleanor St. between 18 and 19 Sts.

Pa., Phila.—Greeley Homes, Inc., 119 Highland Ave., Cynwyd, 68 housing units, Greeley St. between Frontenac and Summerdale Sts.

Pa., Phila.—H.S. Building Corp., c/o H. Skaroff, 1545 N. 6 St., fifty-four housing units, 4300 Block, Glendale St. from Bristol to Cayuga Sts.

Pa., Phila.—Jett Realty Co., 3953 Fairmount St., 44 housing units, Baltimore Ave. between 60 and 61 Sts.

Pa., Phila.—Waverly Constr. Co., 54 St. and Whitby Ave., 38 housing units, Jansen St. between Powhattan and Seneca Sts.

Va., Norfolk—Cottage Toll Homes, Inc., Jas. Monaco, pres., Bayview Blvd. and Cottage Toll Rd., 92 houses, Cottage Toll Rd. $276,000.

★**Ont., Ottawa**—Ottawa Home Builders Assn., K. J. Greene, pres., 541 Hillcrest Ave., 200 houses. $900,000-$950,000 Eng. Staff Wartime Housing Ltd., 55 York St., Toronto, engrs.

CONTRACTS AWARDED

Ala., Decatur—Decatur Homes, Inc., (Andrews-Wood Realty Co.) 2030 4 Ave. N., Birmingham, 56 frame residences, Enolam Oaks Subdivision, day labor. **$200,000.**

California — Industrial Company, nursery, community center, playgrounds, parking lots, administration bldg., etc., Alameda Co., to Barrett & Hilp, 918 Harrison St., San Francisco. CD 10/27—ENR 10/29.

Calif., Gardena—Dawson Homes, Inc., 2918 W. Campton Blvd., 60 frame, stucco dwellings, Owner builds. **$210,000.**

Calif., Long Beach—J. M. Lenney Building Co., 1360 Newport Ave., 102 dwellings, west of Orange Ave., north of San Antonio Dr. Owner builds. Over **$150,000.**

Calif., San Rafael—Jos. L. Stewart, 206 Sansome St., San Francisco, electrical work one hundred fifty 1 story frame residences, Sun Valley Tract, to L. H. Leonardi, 1414 3 St., San Rafael***grading, to Johnson & Nelson, Box 11, San Anselmo***sewer work, to Mario Bottini, 802 C St., San Rafael. CD 11/10—ENR 11/12, under CA.

Calif., Torrance—S. V. Hunsaker, 1027 S. Rives St., Downey, 18 four-unit frame, stucco apartment bldgs. Owner builds. Over **$150,000.** C. N. Aldrich, 1834 Dawson Ave., Long Beach, archt.

La., Monroe—Union Developing Co., Couchwood, 139 housing units, South, 2, 3 and 4 Sts., own forces. FHA.

★**N. J., Camden** — Canterbury at Camden Corp., Camden, c/o G. Iser, archt., 109 29 St., New York, N. Y., twenty-nine 2 story, brick veneer garden apartments, to John E. Muth, Sunrise Highway, Rockville Center, N. Y., **$500,000.**

N. J., Cranford—Birchwood Homes, Inc., 342 Madison Ave., New York, N. Y., one hundred twenty 1 story frame homes, Wilshire Village, separate contracts, **$420,000.** L. Kurtz, 15 44 St., New York, N. Y., archt.

N. J., West Belmar (mail Belmar)—Roosevelt Park, Inc., 2 and Lafayette Aves., Raritan, forty 1½ story, bsmnt., frame residences, separate contracts, **$188,000.** CD 10/14 — ENR 10/22.

Tex., San Antonio—A & H Properties, 1339 S. Flores St., 70 one story dwellings, with 15x18 ft. garages, utilities. Owner builds, **$192,000.**

Utah, Ogden—Dee Memorial Hospital, hospital addn., to Earl S. Paul, 2943 Harrison Blvd., approx. **$250,000.** Bids 11/10. CD 11/9—ENR 11/12.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ark., Guion—DRY KILN, etc.—Silica Products Co., Guion, rebuilding dry kiln and loading chute. $50,000.

Ark., Osceola — WAREHOUSES — R. C. Bryan, Osceola, reconstructing warehouses. $50,000.

Calif., San Francisco—PLANT BUILDING—Matson Navigation Co., 215 Market St. soon lets contract, cafeteria bldg., Pier 36. K. Theill, 580 Market St., engr.

Calif., Sausalito—MACHINE SHOP—Marinship Corp., Sausalito, machine shop addn.

Calif., Sausalito—GARAGE MAINTENANCE—Marinship Corp., Sausalito, garage maintenance bldg.

Conn., Bridgeport—FACTORY—Aluminum Co. of America, 2190 Post Rd., Fairfield, completing plans brick factory, Atlantic St. C. G. MacFarquhar, 2190 Post Rd., Fairfield, engr.

Conn., Glenbrook (Sta. Stamford)—FACTORY—Peabody Eng. Corp., 39 Maple Ave., brick factory addn., Maple Ave. $40,000.

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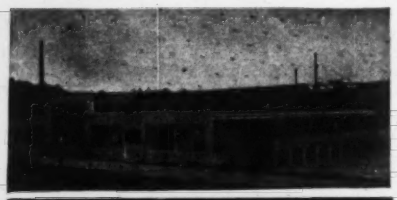

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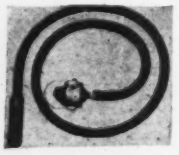

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Ind., Indianapolis — PLANT — The Glidden Co., Berea and Madison Sts., Cleveland, O., remodeling former plant American Hominy Co., also constructing soy bean oil process plant when addnl. ground can be secured. $250,000 or more.

La., New Orleans — PLANT — La-Falstaff Corp. Plant 2, 2600 Gravier St., soon lets contract plant addn. P. P. Cazelle, S. Marlborough Gate, archt.

Mich., Detroit—PLANT—Rotary Electric Steel Co., 21400 Mound Rd., brick, steel, concrete steel plant addn. $150,000. Giffels & Vallet, 1000 Marquette Bldg., engrs.

Minn., St. Paul—FACTORY—Atlas Mfg. Co., 1026 Eustis St., plans by C. A. Hausler, 1593 University Ave., 116x208 ft., brick, steel factory. $65,000.

Mo., St. Louis—FACTORY—Century Electric Co., 1806 Pine St., soon lets contract, 1 story, bsmnt., 109x180 ft., brick, terra cotta, tile factory, Chestnut St. between 18 and 19 Sts. L. Baylor Pendleton and Wm. B. Ittner, Inc., 408 Bd. Educ. Bldg., archts.

N. J., East Rutherford—PLANT—Becton Dickinson Co., Cornelia St., 1 story, brick mfg. bldg. addn. $40,000.

N. J., Newark—PLANT—Sheffield Farms, Inc., 524 W. 57 St., plans by Chas. A. Horton, 222 Clinton Ave., 1 story, brick bottling plant addn. $40,000.

N. Y., Buffalo—MILL—G.L.F. Mills, Inc., Chamber Commerce Bldg., mill addn., Ganson St. Over $40,000.

Pa., Braddock — WAREHOUSE, etc. — A. Paul Dibler, 727 Braddock Ave., and Malcolm Goldsmith, 803 Braddock Ave., Turtle Creek, rebuilding 3 story, bsmnt., warehouse and newspaper office.

Pa., Corry — PLANT — Rohim Mfg. Co., Inc., Corry, plant. Over $40,000. J. R. Dunniho, ch. engr.

Pa., Phila.—PLANT—F. C. Castelli & Co., F and Erie Sts., soon lets contract 145x310 ft. mfg. bldg. and office. Davis & Dunlap, 1717 Sansom St., archts. CD 5/14—ENR 5/21.

Pa., Phila.—FACTORY, etc.—Snyder Paint Co., 2135-47 E. Ontario St., 3 story factory, warehouse, office.

Tenn., Memphis — PLANT — Wm. Haughey, 208 W. Georgia Ave., altering brick, steel concrete mfg. bldgs. $40,000-$45,000.

Tenn., Union City—PLANT—Union City Canning Co., c/o E. A. Craddock, Union City, rebuilding plant. $40,000.

Tex., Snyder—PLANT—Fuller Cotton Oil Co., Snyder, reconstructing cotton oil mill plant. Over $40,000.

Alta., Edmonton—PLANT—Woodland Dairy Ltd., 9508 108 Ave., plant.

B. C., Ainsworth—PLANT—Aryan Florence Mining Co., Ltd., 235 Lonsdale Ave., Toronto, Ont., 150 ton flotation plant, Kootenay Florence Mine.

B. C., Kelowna—SAW MILL—Adams Lake Lumber Co., Ltd., 216A Bernard Ave., saw mill, etc.

B. C., McBride—MILL—McBride Lumber Co., McBride, saw and planing mill, etc.

B. C., Port Alberni — PLANT — Bloedel Stewart & Welch, Ltd., 2 Ave., bids soon, plant. Over $40,000.

B. C., Vancouver—FACTORY—Saanich Canning Co., Ltd., 332 Drake St., factory.

B. C., Vancouver—MILL—Narrows Lumber Co., Ltd., 920 Stock Exchange Bldg., saw and shingle mill.

N. B., St. John—PLANT—Canada Veneers, Ltd., Wall St., 20x85x165 ft. plant, etc., Wall St. $146,000 equipped.

Ont., Campbellford—PLANT—Canada Can Co., Ltd., Campbellford, remodeling, exten. plant.

Ont., Toronto—PLANT—Purdy Mica Mines, Ltd., c/o G. M. Wilton, 80 W. Richmond St., mining-crushing plant. $40,000.

Ont., Toronto — PLANT — Anderson Metal Specialties Ltd., c/o J. J. Glass, 465 Bay St., plant. $40,000.

Que., Beauharnois—PLANT — St. Lawrence Alloys & Metals, Ltd., Beauharnois, bids soon, plant addns. $90,000 incl. equip. CD 4/20—ENR 4/30.

Que., Montreal—PLANT—Canadian Machine Wks. Co., Ltd., 752 Rachel St. E., bids soon, plant addn., Descarrieres and Iberville Sts. $57,750.

Que., Montreal—PLANT—Labelle Kitchen Equipment Co., Ltd., Hutchison St., plant addn., St. John Ward.

Que., St. Boniface—PLANT—L. Boucher Co., St. Boniface, woodworking plant.

Que., St. Paulin de Albert—SAW MILL—F. Pelletier Co., saw mill, etc.

Que., Verdun—PLANT—Aero Engineering & Industrial Co., 1010 Ste Catherine St. W., Montreal, 1 story, 62x181 ft. plant, $60,000. M. Goldway, c/o owner, engr.

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INDUSTRIAL BLDGS. (Contracts Awarded, Continued)

California — SHOP — Industrial Company shop, to C. H. Thrams, 28 Pome Pl., Oakland, E. F. Keefer, 770 Wesley Ave., Oakland, archt.

Calif., Woodleaf — SAWMILL—Sacramento Box & Lumber Co., G. J. Thompson, secy., 65 and R Sts., Sacramento, sawmill, to E. A. Lundin, c/o owner.

Ia., Davenport — PLANT — Uchtorff Co., 211 N. Howell St., 1 story, 120x160 ft. plant addn., to John Soller Constr. Co., 717 Harrison St., $40,000. CD 4/7—ENR 4/9.

Mich., Detroit—FACTORY—Aluminum Co. of America, 3311 Dunn St., brick, steel, concrete factory, plain fdn., oil storage tank, to Stubbard Constr. Co., 3000 Grand River Ave. Est. $150,000. Malcolmson, Calder & Hammond, 1217 Griswold St., archts.

Mich., Detroit—PLANT—Briggs Mfg. Co., Vernon Hy., brick, steel, concrete plant addn., plain fdn., to W. E. Wood Co., 4549 Humboldt Ave. Est. $100,000.

Minn., Gluck—GRAIN ELEVATOR, etc.—Cargill, Inc., 761 Chamber Commerce Bldg., Minneapolis, general contract frame grain elevator and annex, also power house, to T. E. Ibberson Co., 300 Corn Exchange Bldg., Minneapolis. Est. $60,000.

N. J., Belleville—LABORATORY—Wallace & Tiernan Co., Inc., Mill St., 1 story, brick laboratory, to Mahony-Troast Corp., 567 Main Ave., Passaic.

N. J., Little Falls—POWER PLANT—Beattie Mfg. Co., Main St., 1 story, brick, concrete power plant, to L. H. Focht & Son, 529 Court St., Reading. $60,000. Gilbert Assoc. Inc., 412 Washington St., Reading, Pa., engrs.

N. J., Millville — WAREHOUSE — T. C. Wheaton Co., 212 G St., design and construction 1 story, 165x185 ft. frame, concrete, corrugated iron siding warehouse, to Austin Co., Girard Trust Bldg., 1400 S. Penn Sq., Phila., $60,000.

N. J., Newark—FACTORY—M. W. Kellogg Co., foot of Danforth Ave., Jersey City, 1 story, concrete block factory, to Lawrence C. Roberts, Inc., 1 E. 42 St., New York, N. Y., $40,000.

N. J., Newark—FACTORY—Menner Packing Co., 25 Wall St., 1 story factory addn., to P. Jantelle Co., 78 Stuyvesant Ave., Irvington; electrical contract, to A. D. Klein, 55 Wolcott Terrace. Fred G. Nobbe, 1630 Springfield Ave., Maplewood, archt.

Wisconsin — FACTORY — Industrial Company, 6 bays, Unit C of factory, scrap and sand bins, rein-con., brick, to Edw. Steigerwald & Sons, Inc., 5310 W. State St., Milwaukee. CD 8/28—ENR 9/3.

Wis., Delavan — PLANT — Sta-Rite Products, Inc., 1 story, 40x75 ft. brick plant addn., concrete fdn., consisting 5 bays, to Steinar Haugen, Orfordville. Grassold & Johnson, 734 N. Jefferson St., Milwaukee, archts.

Wis., Greenfield (P. O. Milwaukee)—FOUNDRY—Ampco Metal, Inc., 1745 S. 38 St., 1 story, 40x260 ft., steel, concrete block foundry addn., concrete fdn., to Wm. Keierleber Constr. Co., 2249 N. 48 St., Milwaukee.

Wis., Milwaukee — PLANT — International Harvester Co., 1714 W. Bruce St., rein-con. plant, to Gebhard-Berghammer, Inc., 5420 W. State St., A. J. Coon, c/o owner, engr.

Wis., Oshkosh—STORAGE — Buckstaff Co., 1101 S. Main St., 2 story, 30x70 ft., brick storage bldg., concrete fdn., to Ben B. Ganther Co., 78 State St.

Wis., Sparta—PLANT—Pet Milk Co., Sparta, 2 story, brick, steel plant addn., concrete fdn., day labor. CD 10/20—ENR 10/29.

N. S., Halifax—PLANT—Foundation Maritime Ltd., 135 Lower Water St., plant addn., day labor. $300,000.

Ont., Brantford — PLANT — Cockshutt Plow Co., Ltd., Mohawk St., plant addn., also dope shop, to Pigott Constr. Co., Ltd., Pigott Bldg., Hamilton. $108,500.

Ont., Ottawa — PLANT — Ontario Hughes-Owens Co., Ltd., Sussex St., 3 story plant, Spencer St. and Hamilton Ave., to Ross-Meagher, Ltd., 7 Echo Dr., about $75,000. CD 10/13—ENR 10/15.

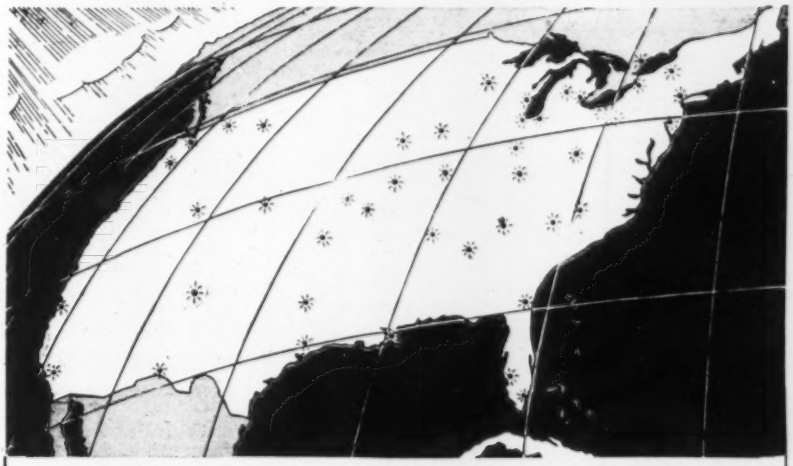
Ont., Toronto—SHOP—John Inglis Co., Ltd., 14-24 Strachan Ave., 3 story plate shop office, addnl. top story telephone switchboard bldg., to A. W. Robertson, Ltd., 57 Bloor St. W., $69,000. Allward & Gouinlock, 57 Bloor St. W., archts.

P. E. I., Summerside—PLANT—Island Foods Incorp., Charlottetown, 1½ story, 64x130 ft. frame dehydration plant, concrete fdn., to Morrison & McRae, Water St., about $50,000. CD 11/20.

Que., Beauharbois—PLANT—St. Lawrence Metal & Alloys Ltd., Canal Rd., plant addn., to Jas. W. Ross, 1010 St. Catherine St. W., Montreal, $56,000. CD 11/19—ENR 11/26.

Que., Montreal—PLANT—Canadian Pratt & Whitney Co., Ltd., 150 Lorne Longueuil, Montreal, repairing plant, 15x25 ft. engine test house, addn., 36x150 ft. addn. motor storage bldg., 36x67 ft. stripping bldg., etc., to Sutherland Constr. Co., Ltd., 1440 Ste. Catherine St. W., Montreal, about $65,000. E. J. Turnotte, 1010 Ste. Catherine St. W., archt.

Strategic Heating Points



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Steen Fan & Blower Co.
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Sullivan Valve and Eng.
CHARLESTON, W. VA.
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CHARLOTTE, N. CAROLINA
Walker and Merck
CHICAGO, ILLINOIS
Dravo Corporation
CLEVELAND, OHIO
Dravo Corporation
DALLAS, TEXAS
Rodgers Engineering Co.
DENVER, COLORADO
Harry H. Herman
DES MOINES, IOWA
Delevan Engineering Co.
DETROIT, MICHIGAN
Dravo Corporation
EL PASO, TEXAS
Boyd Engineering Co.
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W. C. Ladd Co.
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D. A. Brown Company
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H. H. Wright
LOS ANGELES, CALIF.
H. F. Haldeman, Inc.
LOUISVILLE, KENTUCKY
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MEMPHIS, TENNESSEE
Southern Sales Co.
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Rushby C. Midgeley
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